ROYAL BOTANIC GARDENS VICTORIA

Muelleria

Plant, Algal and Fungal Taxonomy and Systematics

Vol 40, 2021–2022

***Caladenia fitzgeraldii* Rupp, *Austral. Orchid Rev*. 7(4): 64 (1942).**
Source: State Botanical Collection
Illustration: Robert D. Fitzgerald (1876)
The Spider Orchid *Caladenia fitzgeraldii* is an example of a species represented by an iconotype—that is, the type is an illustration rather than a preserved physical specimen. The type, adapted here from Fitzgerald's *Australian orchids, Volumes 1 & 2* (1875-1894), is a plate by Fitzgerald illustrating three plants—two sharing the same sheath and collar—which Fitzgerald had identified as *C. clavigera*.

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ROYAL BOTANIC GARDENS VICTORIA

East Gippsland's Clubbed Spider *Caladenia* (Orchidaceae: Caladeniinae)

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Introduction

The taxonomic status of a number of clubbed spider *Caladenia* R.Br. taxa in East Gippsland (here defined as that part of Victoria east of Longitude 147° – roughly east of Sale and Wodonga) has been a matter of uncertainty among botanists since formal recognition of taxa within the *C. reticulata* Fitzg. group began in 1991 (Carr 1991). In this work, the formally described clubbed spider *Caladenia* species recorded for E. Gippsland are considered, namely: *Caladenia aestiva* D.L.Jones, *C. ancylosa* (D.L.Jones) G.N.Backh., *C. australis* G.W.Carr, *C. clavigera* A.Cunn. ex Lindl., *C. fitzgeraldii* Rupp, *C. flavovirens* G.W.Carr, *C. montana* G.W.Carr, *C. oreophila* (D.L.Jones) G.N.Backh., *C. osmera* (D.L.Jones) G.N.Backh., *C. peisleyi* (D.L.Jones) G.N.Backh. and *C. valida* (Nicholls) M.A.Clem. & D.L.Jones. *Caladenia turneri* Kosky is described here as new as part of this revision.

This study was informed by extensive field studies carried out over a period of more than 20 years, involving careful examination and analysis of specimen characteristics supported by detailed photographic records of all studied populations of these species within E. Gippsland, supported by similar observations made from populations elsewhere in Victoria, South Australia, New South Wales and the Australian Capital Territory to allow for detailed comparisons and a holistic overview of this group across a wide range. Specimens, including type materials, of the taxa in question were also examined at CANB, MEL and NSW (acronyms per

Abstract

All currently described clubbed spider *Caladenia* species known from East Gippsland (Victoria, Australia) are considered and the taxonomy of the group revised following extensive fieldwork and systematic analysis of population-based morphological measurements. *Caladenia fitzgeraldii* is recognised as occurring in Victoria; *C. oreophila* is reduced to a synonym of *C. fitzgeraldii*; *C. osmera* is reduced to a synonym of *C. montana*; *C. aestiva* is reduced to a synonym of *C. flavovirens*: and *Caladenia turneri*, with affinities to *Caladenia montana*, is described as new. An updated key to the group is provided.

Keywords: *Caladenia*, taxonomy, population analysis, labellum teeth-counting

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Thiers 2021 [continuously updated]) with the following exceptions:

1. Certain types are represented by illustrations, namely R.D. Fitzgerald's illustration of *Caladenia clavigera*, Fitzgerald (1876), nominated as the type for *C. fitzgeraldii* by Rupp (1942); and, for *C. valida*, W.H. Nicholls' illustration of *Caladenia reticulata var. valida* (Nicholls 1969: 67).
2. For *C. clavigera*, the lectotype and two syntypes held at K were examined via high resolution images available from http://apps.kew.org/herbcat/.
3. For *C. australis*, there are historic but no recent records from E. Gippsland. For this species, field studies and detailed photographic records of the nearest populations in South Gippsland, at Won Wron, Mullundung, and both at and near its Wilsons Promontory type locality, were used for the purposes of comparison.

The publications *Bush Gems* (Backhouse *et al*. 2016) and *Orchids of East Gippsland* (Turner *et al*. 2018) contain a good selection of *in situ* photos of all these species showing many of the variations described here. *Caladenia turneri* appears in these under the common name Turner's Spider-orchid. *A Complete Guide to Native Orchids of Australia* (Jones 2021: 119,125,131) contains excellent line drawings of the flattened labella of *C. australis, C. clavigera, C. fitzgeraldii, C. flavovirens* (as *C. aestiva*), *C. montana* and *C. valida.*

Issues in distinguishing like species

In the descriptions of *Caladenia australis* and *C. montana* (Carr 1991), *C. ancylosa* (Jones 1991), *C. oreophila, C. osmera* and *C. peisleyi* (Jones 2006b), little if any commentary and no keys were provided to distinguish between the taxa, nor they from *C. fitzgeraldii* which, at various times, has been said to be present in E. Gippsland (Rupp 1942; Clements 1993; Walsh & Entwisle 1994). VicFlora (2019) treats any Victorian plants identified as *Caladenia fitzgeraldii* as 'misapplied for *Caladenia montana*'. Prior to this interpretation, *C. montana* was regarded as a taxonomic synonym of *C. fitzgeraldii* (Clements 1993; Walsh & Entwisle 1994).

Caladenia flavovirens and *C. aestiva* were described within two months of each other and referenced plants from common populations, with Jones (1991) referencing as *C. aestiva* a specimen (MEL 2149601) from the *C. flavovirens* type locality, and a specimen from Mt. Cobbler (MEL 578989) cited by Carr (1991) as *C. flavovirens*.

A review of relevant literature (Rupp 1942; Carr 1991; Clements 1993; Walsh & Entwisle 1994; Riley & Banks 2002; Jones 2006a, 2006b, 2021; Swarts *et.al*. 2014; Backhouse *et al*. 2016; Backhouse 2018; Turner *et al*. 2018; VicFlora 2019; New South Wales Flora Online 2019) reveals a variety of differing methods and traits deemed acceptable for the circumscription of these species, as well as disparate opinions and degrees of uncertainty regarding their taxonomy, distribution and population size for all of these species save *C. clavigera* and *C. ancylosa*. In many instances, the descriptions and any keys they contain rely on a range of distinguishing features, including size, location, tepal posture, a particular consistent clubbing arrangement (including length of sepal clubs, and the presence or absence of petal clubbing), colour and colour placement, or features common to more than one species. Some, such as VicFlora (2019), Walsh & Entwisle (1994) and Jones (2021) have descriptions and illustrations of labellum shape, teeth shape and placement, and in some cases refer to teeth numbers, but there is no consistent, sophisticated and systematic comparison of these features across like species, nor any detailed examination of variation within species.

In VicFlora (2019), the descriptions are qualified by comments such as: "*Caladenia montana* is similar to, and could be confused with, a few other eastern species; see *C. oreophila, C. peisleyi, C. osmera* and *C. australis*. It is also difficult to distinguish from the NSW species *C. fitzgeraldii*." This uncertainty is reflected in herbarium collections and may lead to the misidentification of plants used in scientific and pollinator studies. *See* Supplementary Tables 1 & 2.

Population studies

A characteristic of E. Gippsland's clubbed spider *Caladenia* is considerable variation in the traits that might be used to identify a particular species, and also to distinguish it from like species. Further, many of the traits that have traditionally been used to identify these species are common to more than one species.

A number of populations of each species, from locations across their distribution, were examined

over multiple seasons to determine which traits were taxonomically useful, as well as the extent of their variation within each species.

Study objectives

The principal objectives of this population study were to:

1. Determine to what extent, if any, these species can be distinguished by:
   - 1.1 a unique labellum, including labellum shape, the number, shape and placement of labellum margin teeth [teeth, labellum teeth] and lamina calli [calli]
   - 1.2 reference to particular forms and arrangements of tepal osmophore formations
   - 1.3 size measurements
   - 1.4 other traits.
2. Clarify the taxonomic status of some of the named taxa, particularly:
   - 2.1 *Caladenia fitzgeraldii* and whether it can be distinguished from *C. montana* and *C. turneri*
   - 2.2 *C. oreophila* and its distinctiveness from *C. fitzgeraldii*
   - 2.3 *C. osmera* and its distinctiveness from *C. montana*
   - 2.4 *C. aestiva* and its distinctiveness from *C. flavovirens*
   - 2.5 The clubbed spider *Caladenia* at Raymond Island, referenced in Backhouse *et al.* (2016) as *Caladenia* 'Raymond Island' and in Turner *et al.* (2018) as *C.* aff. *valida*, and its distinctiveness from *C. valida.*
3. Provide a practical working key with associated notes to facilitate the identification of these often difficult to distinguish species.

Methods

Type and other representative specimens, as well as protologues and other published descriptions were used to apply existing names with as much accuracy as possible.

For each species, close up digital photographs were taken of selected parts of pressed specimens, as well as of living plants *in situ*, to illustrate key diagnostic characteristics. The broadest possible sample of living plants or pressed specimens were captured for each taxon and individually labelled. Selected traits of individual plants were identified and recorded in multiple Excel spreadsheets by population and date. As an example, the data for *C. montana* was contained in two multi-page workbooks containing 26 site-specific pages and 22 linked summary tables and charts. These working spreadsheets were used to determine the relevant traits for each species, trait frequency, the degree of trait variation in, and across, populations, and to compare the different species, the gist of which is described in this paper.

In this study only teeth discernible as such were counted, as opposed to irregular or minutely serrate margins.

Assessment of diagnostic characters

Labellum characteristics

Labellum shape and teeth placement: *Caladenia clavigera* is readily distinguished from all other E. Gippsland clubbed spider orchids by its unique cordate labellum (and inter alia by the size and arrangement of its tepal osmophore formations).

Caladenia flavovirens (including *C. aestiva*), *C. valida* and *C. ancylosa* have similar, reasonably consistent, obscurely 3-lobed labella with erect, more or less uniform, acinaciform (i.e. scimitar-shaped, in all instances herein with apical notching on the convex rather than concave side of the curve – see side lobe teeth Figure 12b) to somewhat linear edge teeth beginning near the base and decreasing in size to the tip. Whilst this serves to distinguish them from other E. Gippsland clubbed spider *Caladenia*, the differences in their labella are subtle, and other traits must be used to distinguish between them.

For *Caladenia australis, C. fitzgeraldii* (including *C. oreophila*), *C. montana* (including *C. osmera*), *C. peisleyi* and *C. turneri,* whose labellum margin teeth are not continuous from the base to the tip, it is their unique labellum morphologies that are a principal indicator of their identity. These differing morphologies are described in the body of this paper. For this group, while labellum characteristics – such as overall size and shape, and the shape, formation and number of calli and teeth – on flowers in a patch of plants of a single species does vary, these variations occur within reasonably narrow, quantifiable limits that, at the population level, are characteristic for that species.

Teeth counts: Of particular interest in this study was determining whether *Caladenia australis, C. fitzgeraldii* (including *C. oreophila*), *C. montana* (including

C. osmera), *C. peisleyi* and *C. turneri* could be reliably distinguished by counting and comparing the number of labellum teeth pairs seen on plants of each species. Table 1 contains a summary of the conducted count of teeth pairs.

Comparing the typical teeth count range of a pair of species like *C. fitzgeraldii* (7–12 pairs) and *C. turneri* (9–14 pairs) shows considerable overlap that might lead one to conclude that they are one species if one disregards the other traits that readily distinguish them. In such cases, the ranges of the teeth count figures cannot be used to distinguish between species, they merely illustrate the considerable degree of variation in teeth numbers encountered in nature.

However, when a teeth count for a population of 20 or more of any one of these five species is averaged, it produces a mean value that is unique to that species, revealing a reliable indicator of species identity. Further, in a population by population breakdown of the data for each of these species, the variation in mean teeth pair counts of different populations of 20 or more plants of a given species rarely exceeds the mean count for all populations of that species ±1. This is demonstrated in Table 2a.

This data, matched to labellum morphology, establishes that the different mean teeth count for each species is determined by the physical characteristics of the labellum, such as relative length of labellum, and the general placement of teeth along its margin. Thus *C. australis* (mean 17.00), which of the five species has a longer, larger labellum (12–15 mm long, ~10 mm wide) and the most extensive coverage of teeth (from near the base to near the tip), produces a higher mean teeth count than *C. peisleyi* (7.66), which has a shorter, stubby labellum (6–9 mm long, 5–8 wide) with teeth generally limited to the middle of its margins. This is visually illustrated in Table 2b.

Calli: In all species studied, the calli are more or less the same shape, of moderate thickness, foot-shaped to linear, without bulbous heads, and in all species arranged in 4–6 sparse to moderately crowded rows, often with a shorter and/or irregular outer row when six rows are present. There is trait variation within and between species, including in the percentage of plants with six or four rows of calli, and the extent to which calli extend towards the distal part of the labellum. For these species, calli examination is not a reliable character for distinguishing between taxa.

Tepal osmophore formations

The term 'osmophore' is here used strictly to refer to scent glands. All the subject species produce osmophores that are present on some or all tepals; these are sessile and either spherical or elongated (obovoid) and generally

Table 1. Summary of teeth counts for E. Gippsland spider *Caladenia*

Species	No. of plants	No. of sites	Mean no. teeth	Typical range	% of plants in typical range	Extreme range
C. peisleyi						
Typical	96	12	**7.74**	5-10	78%	2-15
Fat-legged *C. peisleyi* (with broader tepals, Lees Ck)	17	1	**7.35**	4-10	82%	3-10
C. peisleyi	113	13	**7.68**	4–10	80%	2–15
C. fitzgeraldii[1] Vic & *C. oreophila* type locality NSW	106	7	**9.08**	7–12	77%	3–15
C. fitzgeraldii[2] NSW	22	13	**8.98**	8–11	77%	6–14
C. montana above 900 m elevation	189	12	**13.61**	10–16	85%	5–26
C. montana[3] E. Gippsland Coast to 900 m elevation	81	5	**13.17**	10–16	91%	7–22
C. turneri	94	3	**10.63**	9–14	89%	6–15
C. australis - South Gippsland	84	3	**17.00**	12–20	81%	10–27

Teeth counts are of pairs. i.e. on either side of labellum

[1]These are plants described as *C. oreophila* by Jones (2006b). They include 13 plants (12%) from the *C. oreophila* type site that returned an average teeth count of 9.

[2]The lower sample size means that these figures are not as robustly supported as others quoted.

[3]These are plants described as *C. osmera* by Jones (2006b), including 32 plants (40%) from or within 500 m of the *C. osmera* type locality.

less than 1.5 times longer than they are wide (*see* Figure 1 a–c). Figure 1 also includes examples of stalked (1d) and hair-like (1e) osmophores for comparison. Apart from *Caladenia clavigera*, which either lacks or has tiny lateral sepal clubs, and *C. flavovirens*, in which the sepals vary between clubbed and tailed (Figure 2), the subject species mostly comprise populations with clubbed dorsal and lateral sepals. These are distally covered with more or less spherical osmophores, and show some thickening of the sepal ends, forming clubs of varying lengths, but typically comprising no more than one-third of total sepal length. Where the distal thickening is slight (≤1.4× wider than the narrowest part of tepal) the clubs are described as 'light clubs' (Figures 2c, 4a). Where they are noticeably thickened (>1.4× wider than the narrowest part) they are described as 'heavy clubs' (Figures 2d, 2f, 3a, 4c, 4g). Figures 1–4 show examples of sepal clubs that are more or less terete in section ('round clubs'), flattened ('flat/flattened clubs'), or with a central channel along their adaxial surface ('channelled clubs'). The covering of osmophores may be reasonably dense and end fairly abruptly; these described as 'well-defined clubs'. Conversely, where sepal ends are only slightly thickened, the osmophore cover moderately dense to sparse distally and increasingly sparse proximally and scattered further along the sepal, they are described as 'poorly-defined clubs'.

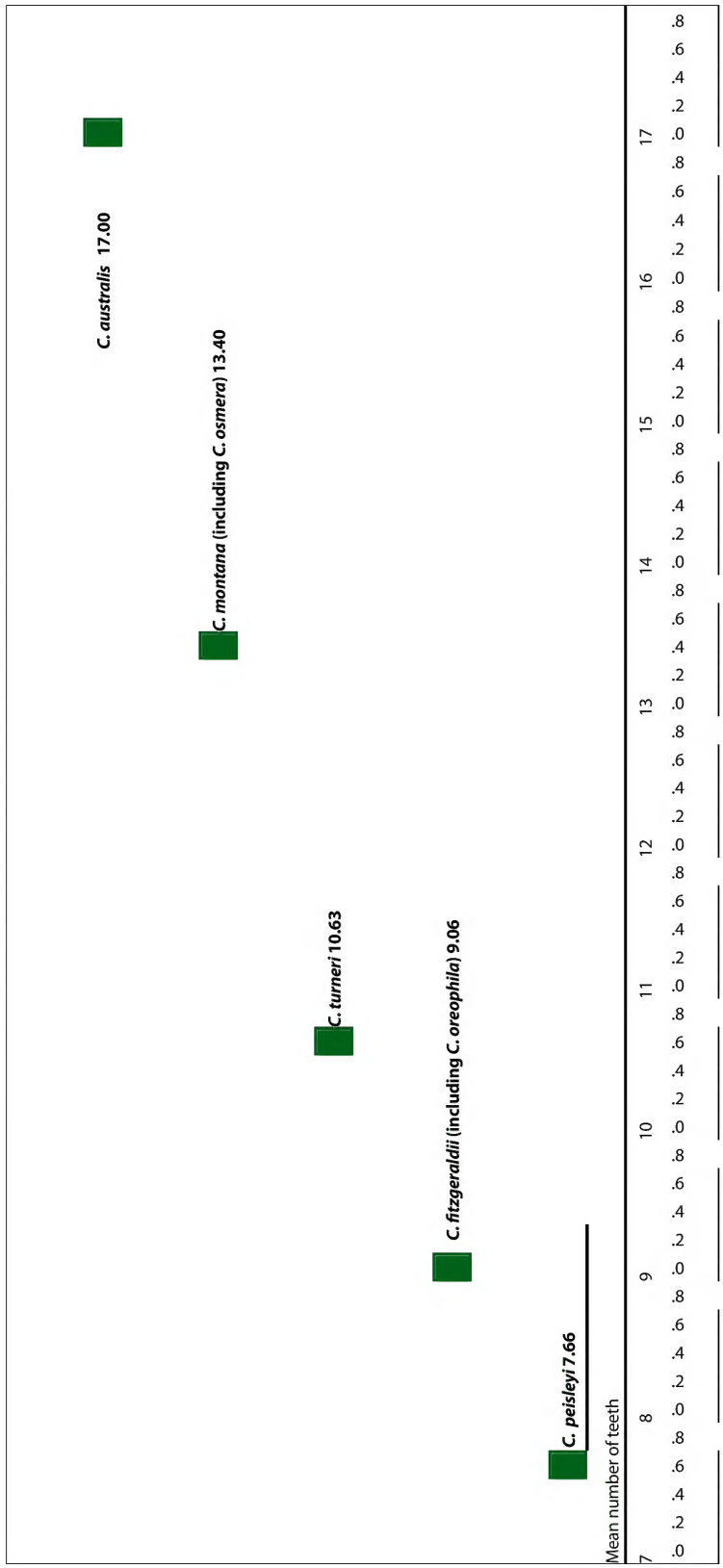
Some species have fairly uniform clubs across their range, or with one particular form predominating (e.g. *C. fitzgeraldii*), while in others a variety of different forms may be produced (e.g. *C. montana*). Some flowers of *C. flavovirens, C. ancylosa, C. australis, C. montana,*

Table 2a. Mean teeth pair counts for selected populations. Where stated, elevations are approximate.

Caladenia australis	**No. of labella counted**	**Mean no. teeth**	**Variation from mean**
Won Wron - Napier	28	16.61	-0.39
Won Wron - Dog Trap	48	17.29	0.29
Mullundung*	8	16.65	-0.35
Total:	**84**	**17.00**	
***Caladenia montana* (and *C. osmera*)**			
Cobungra (1100 m)	53	14.29	0.88
Anglers Rest North (1150 m)*	5	15.00	1.60
Knocker (1000 m)	30	14.00	0.60
Limestone Creek Track (1060 m)*	14	14.64	1.24
Cowambat (1300 m)	68	12.91	-0.49
Wulgulmerang (1000 m)*	15	11.93	-1.47
Total High Country	**185**	**13.61**	**0.21**
Noorinbee inc. *C. osmera* type locality (150–270 m)	58	13.10	-0.30
Stoney Pt Track (190 m)*	15	12.50	-0.90
Geno Pk Tk (50–110 m)*	8	14.30	0.90
All coast to foothills (incl. as *C. osmera*)	139	13.17	-0.23
Mt Tamboritha (1200–1260 m)*	17	12.59	-0.81
Goongerah (280–300 m)	21	13.24	-0.16
Total:	**304**	**13.40**	

Caladenia turneri	**No. of labella counted**	**Mean no. teeth**	**Variation from mean**
Lees Creek	76	10.75	0.12
Winkie type site	14	10.21	-0.42
Freestone Road*	4	9.75	-0.88
Total:	**94**	**10.63**	
***Caladenia fitzgeraldii* (inc. *C. oreophila*)**			
NSW various	22	8.98	-0.08
C. oreophila type locality*	13	9.00	-0.06
Coloquhoun	39	8.97	-0.09
Yalmay*	8	9.63	0.57
Goongarah	46	9.09	0.03
Total:	**128**	**9.06**	
Caladenia peisleyi			
Colquhoun	24	8.17	0.51
Total 11 sites each <20 plants*	11	7.61	-0.05
Fat Legged Peisleyi (Lees Creek)*	17	7.20	-0.46
Total:	**113**	**7.66**	
* samples from fewer than 20 labella			

Table 2b. Visual comparison of mean number of teeth between species.



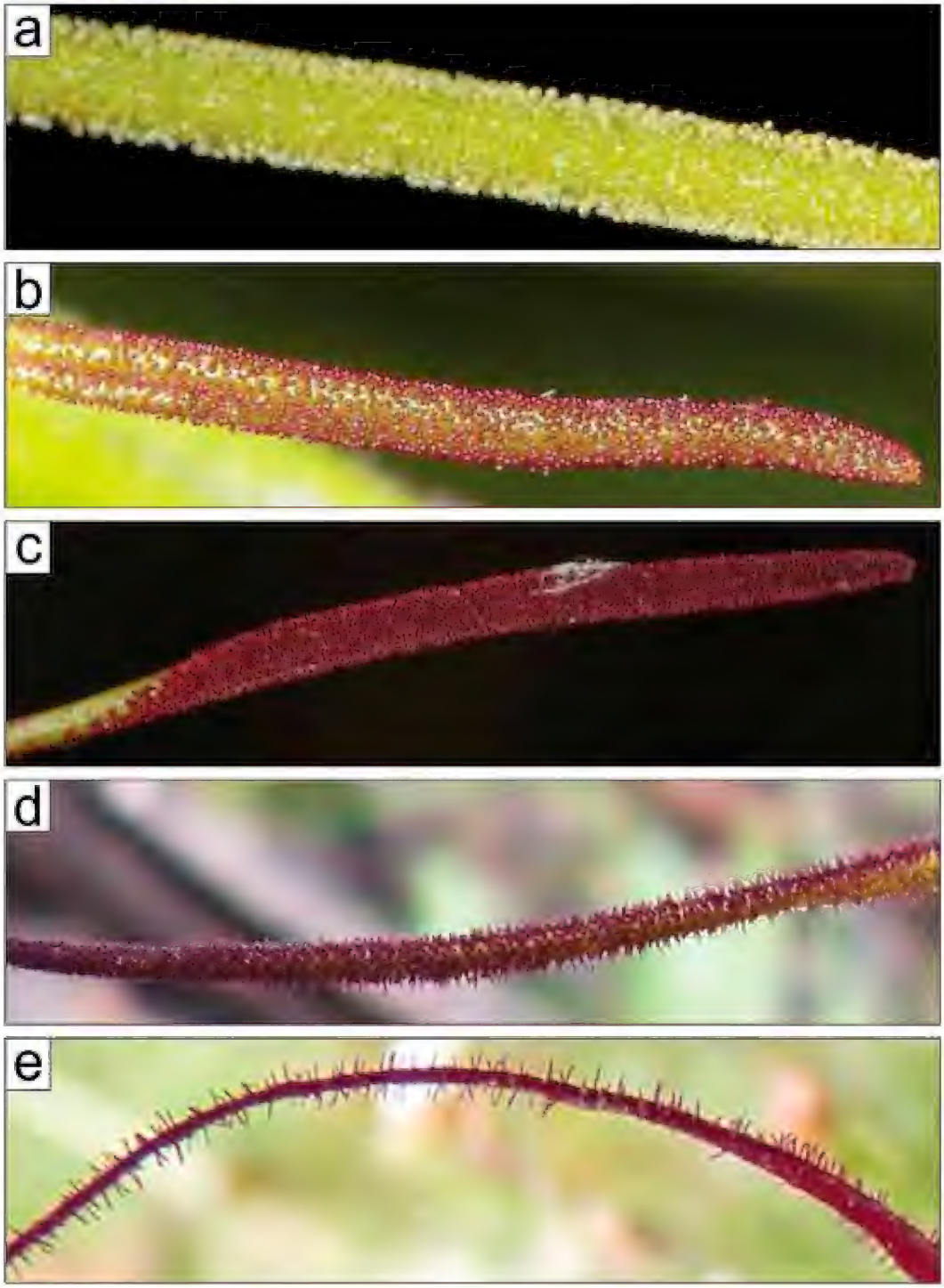


Figure 1. a–c. Lateral sepals with sessile, spherical to obovoid, osmophores; a–b. *Caladenia flavovirens,* showing non-contiguous osmophores, colour, shape and density: a, tailed form Montrose; b, clubbed form Cobungra South; c. densely clustered osmophores on the dorsal sepal club of *C. turneri,* near Lees Creek; d. stalked osmophores on the lateral sepal *C. fulva*, Three Jacks, Stawell; and e. hair-like osmophores in *C. filamentosa,* Limestone Track, Cobberas. (Photos a-b: R.Kuiter, c: L. Carrigan, d-e: W. Kosky)

C. turneri and *C. valida* have sepals without any distal thickening, a relatively sparse covering of osmophores that is proximally increasingly sparse, and often covering more than one third of the total sepal length, referred to here as 'tails' or 'tailed' (see Figures 1a, 2b, 2e, 3b 4d, 8c detail). In some cases, the distinction between clubbed and tailed formations is slight, with what are essentially tailed tepals having a very slightly thickened distal section, called 'indistinct clubs' (Figures 2a, 4a, 4e, 4f). In all the subject species except *C. clavigera,* the dorsal sepal is usually similar to the lateral sepals, though sometimes a little thicker, and all except *C. clavigera* and *C. ancylosa*, will to varying degrees have some flowers with osmophores on the ends of their petals, particularly following fire. Tepal clubbing can be remarkably inconsistent; for example, a double-flowered plant of *C. valida* was observed to have one flower with clubbed lateral sepals, its other flower with tailed lateral sepals Similarly, in many populations of *C. flavovirens,* flowers were observed with a variety of different tepal osmophore formations, including flowers with tailed lateral sepals, and clubbed petals and dorsal sepals.

The colour of osmophores varies in all species, and in some species more than others. In most cases osmophores are red to burgundy, but also sometimes translucent green, yellow or almost black. When osmophores form dense clusters on tepals, the colour of the club or tail is determined by the colour of the osmophores. When osmophores are sparsely distributed, the overall club or tail colour is determined by a combination of the colours of the osmophores and that of the tepal body, usually red/burgundy on yellow resulting in tan clubs or tails or, if colourless, the colour of the underlying tepal prevails (Figure 1a–c, 2, 4).

The clubbing arrangements seen in most populations

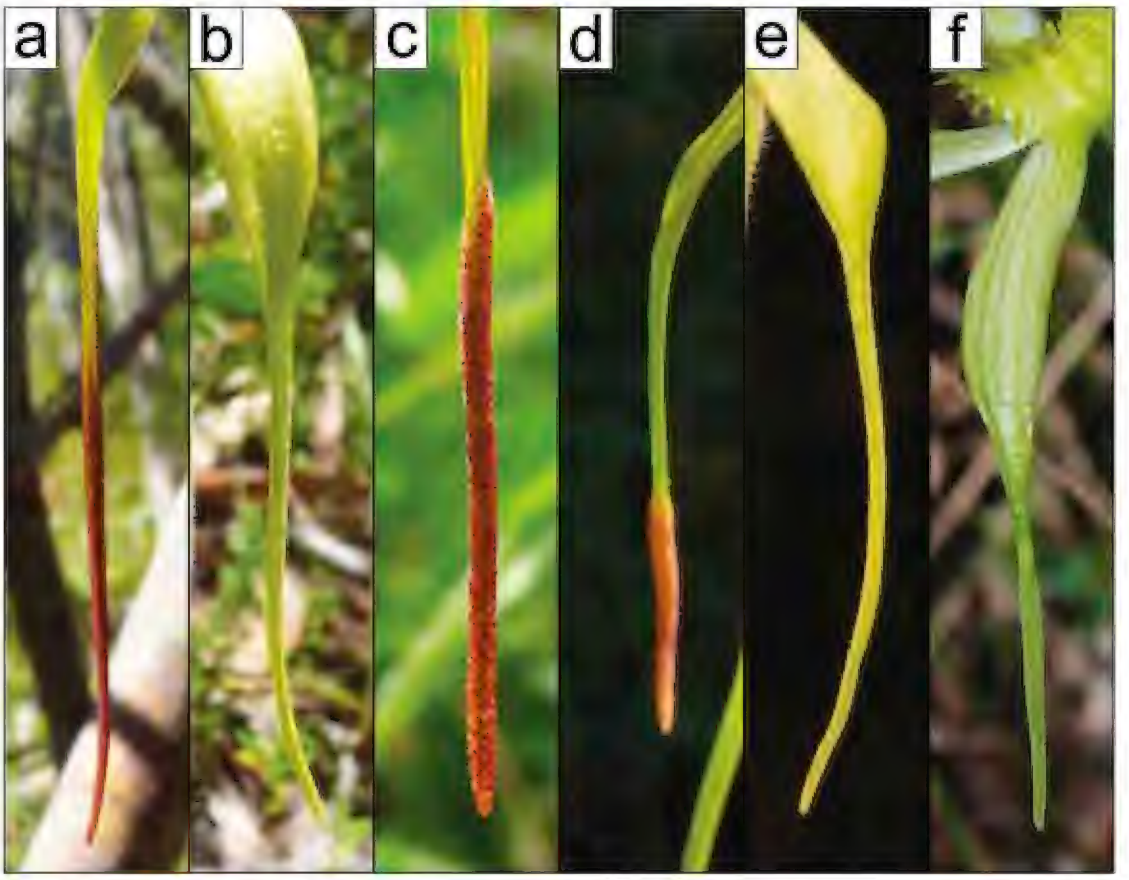


Figure 2. Examples of lateral sepal end osmophore formations in *Caladenia flavovirens*. a-b. Wombargo Creek, Wulgulmerang; c-d. Cobungra South; e. Healesville; f. Montrose type locality (Photos: a-d: W. Kosky, e: W. Probert, f: M. Rowan).

of *Caladenia montana* are illustrated in Figure 4, with a tendency for large plants with a longer covering of osmophores to occur in damper, less open, forests. The principal difference between the large plants of *C. montana* with tailed or tail-like indistinct clubs (e.g. Figure 4 d–f) and those of *C. flavovirens* with tailed or indistinct clubs is that in *C. montana* the osmophores are mostly contiguous, while in *C. flavovirens* they mostly are not.

This morphology does not support the contention that these species can be distinguished as separate species solely by their tepal osmophore formations, and in particular solely on the basis of having clubbed or tailed formations. The division of spider *Caladenia* into clubbed and tailed species is in itself somewhat artificial, and reference to the shape of their osmophores is more appropriate.

Size measurements

In this group of species, measurement of a single plant is of little use in determining its identity. The ratio of petal length to lateral sepal length is variable, but petals are usually shorter. The dorsal sepal is usually marginally shorter than the lateral sepals and, unlike the lateral sepals, is difficult to measure in the field. In this work, the length of lateral sepals has been found to be the better, more consistent and easier to measure indicator of flower size for comparison. However, across these species there

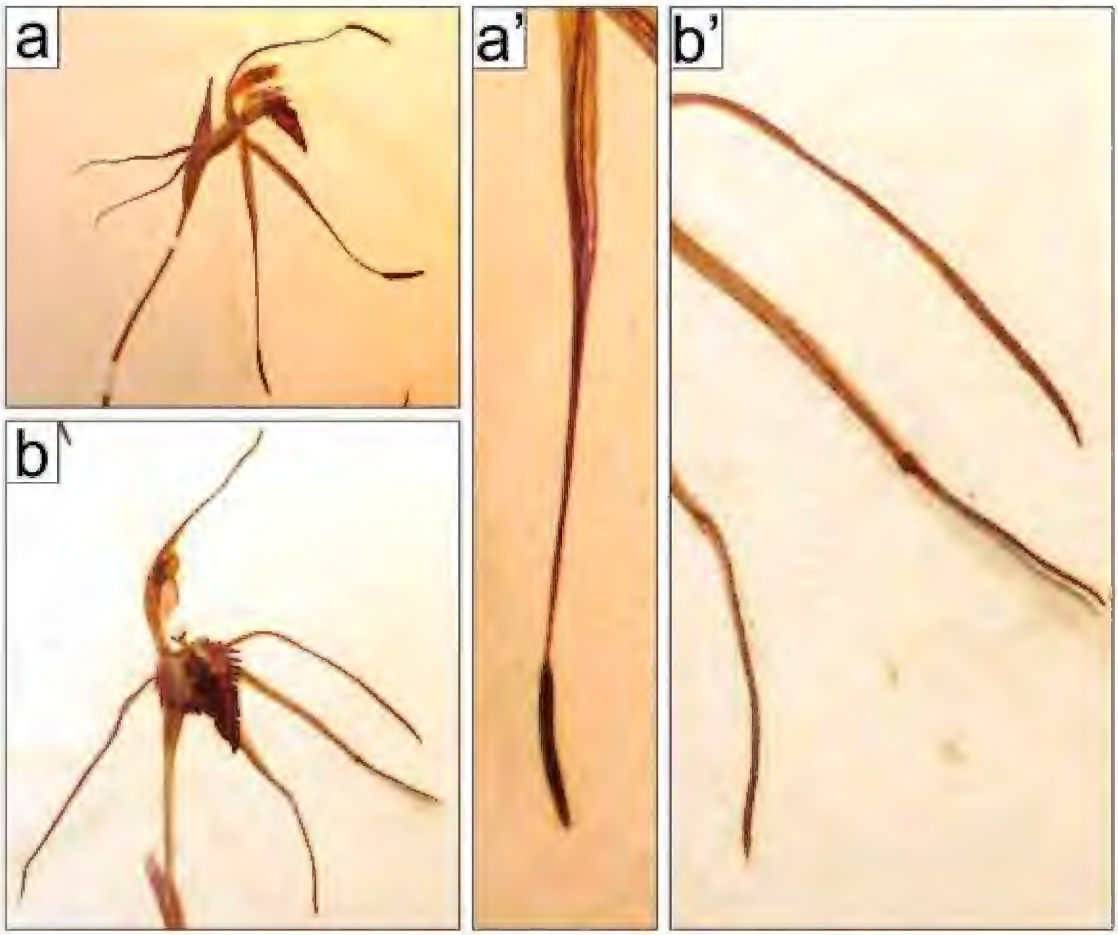


Figure 3. Detail of *Caladenia australis* holotype bearing plants labelled 'a' and 'b' (Wilson's Promontory, Victoria. *J.H.Willis* 17.x.1933. MEL 577737). a. plant 'a' with well-defined heavy sepal clubs bearing densely packed osmophores, petals without clubs that are shorter than the sepals. b. plant 'b' with tailed lateral sepals and left petal, the right petal and dorsal sepal indistinctly clubbed, length of sepals and petals similar. Whilst 'a' represents the more common form, plants like 'b' are often seen, for example in populations of *C. australis* in the Moe/Mirboo North region (Photos: W. Kosky).

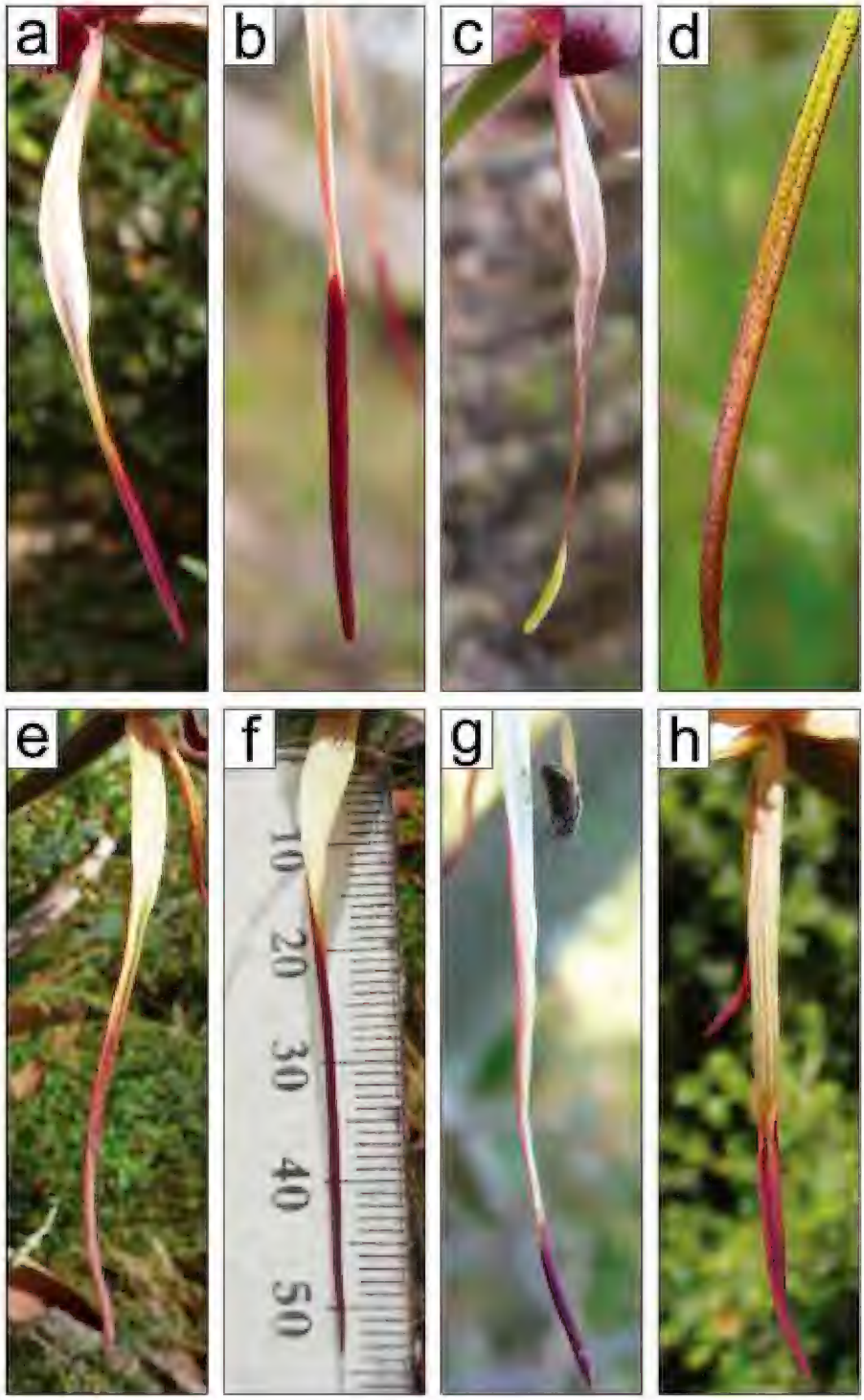


Figure 4: The variety of lateral sepal osmophore formations seen in *Caladenia montana*. a. Cobungra; b. Noorinbee at *C. osmera* type site; c. Genoa; d–f. Large plants at Cobungra South; f. lateral sepal 6 cm long, dense osmophore cover 3.5 cm; g. Cobberas; h. Cobungra, pinched and flattened (Photos: W. Kosky).

is an overlap in size that changes in response to various external factors. For example, in post-fire landscapes plants of the smallest species *Caladenia clavigera* and *C. peisleyi* may give rise to measurements comparable to medium to large species like *C. montana* and *C. australis*.

That said, measurements of populations of species, particularly over a number of seasons and across diverse locations, do allow for the degree of variation within a species to be characterised, and generate average values that allow for a generalised size comparison with other species. A 2004–2010 study of a small number of *C. valida* at Raymond Island established that, whilst the range of lateral sepal lengths for this population can vary considerably from year to year, the average length over the study period is reasonably consistent (A. Bould, pers. comm.). For example, in 2008 (the driest season) the range was 1.8–3.5 cm (mean = 3.1 cm), compared with 2010 (the best season), when the range was quite different, at 2.4–4.5 cm, but with a similar mean of 3.35 cm. The mean lateral sepal length over the study period was 3.17 cm, with annual variations within the range of 3.17 ± 0.2 cm.

Other traits

The morphological analysis in the next section, as well as the key and its notes, describe the traits that individually or in combination serve to identify the E. Gippsland clubbed spider *Caladenia*. The following should be noted:

- While details of the environment in which a plant occurs are relevant to our understanding of a given species (and orchid species concepts generally) and might be used to provide collaborative evidence about an orchid's identification, features such as location, habitat, elevation, aspect and climate are not endogenous attributes. As such, they should not be used or relied upon to identify a plant species, nor indeed to separate taxa into different species.
- Following fire, the range of variation and the vigour of plants reaches extremes, with petal clubbing and multiple flowers often being common in species among which they are uncommon in the absence of fire (for example *Caladenia peisleyi*, pers. obs.).
- In most subject species tepal posture changes with flower age.
- Flattening the curved surface of the area from the labellum base to its widest point often folds segments into pleats that visually under-represent the actual extent/area of the base section, including any side lobes.
- The labellum surface of all species treated here is grainy and sub-hyaline, giving a semi-glossy appearance. Labellum glossiness is not a reliable distinguishing trait as it is subjective and easily affected by wetness, secretions, sun, flash lighting and quality of ambient light.

Taxonomy

Caladenia fitzgeraldii, *C. montana* and *C. turneri*

The relative scarcity of *Caladenia fitzgeraldii* has given rise to uncertainty and differing opinions regarding the identity and distribution of *C. montana* and *C. fitzgeraldii* in south-eastern Australia; when both species occur together, the close morphology of the taxa has also resulted in a tendency to treat all plants at mixed populations as representing the one taxon or the other. This issue is compounded by the presence of apparent hybrids between the taxa at some locations; the appearance of *C. fitzgeraldii* resulting in its being designated by some authors as the hybrid *C. montana* × *C. clavigera*; the naming of plants indistinguishable from *C. fitzgeraldii* in the upper Cann River Valley near the Victoria–New South Wales border as *C. oreophila*; and plants in near-coastal E. Gippsland, indistinguishable from *C. montana*, being named as *C. osmera*. The key distinguishing characteristics of these taxa are set forth in Table 3 and illustrated in Figure 5.

Caladenia turneri can be distinguished from *C. fitzgeraldii* by way of its obscurely three-lobed labellum with elevated margins, including teeth, which begin on the rise from the base and extend up to halfway along the mid-lobe.

Caladenia fitzgeraldii and *C. oreophila*

Caladenia fitzgeraldii Rupp, *Austral. Orchid Rev.* 7: 64 (1942). *Arachnorchis fitzgeraldii* (Rupp) D.L.Jones & M.A.Clem. *Orchadian* 13(9): 394 (2001); *Calonemorchis fitzgeraldii* (Rupp) Szlach., *Polish Bot. J.* 46(2): 139 (2002). Type: Fitzgerald's plate in *Austral. Orch.* 1: pt 2! (1876) as *C. clavigera*.

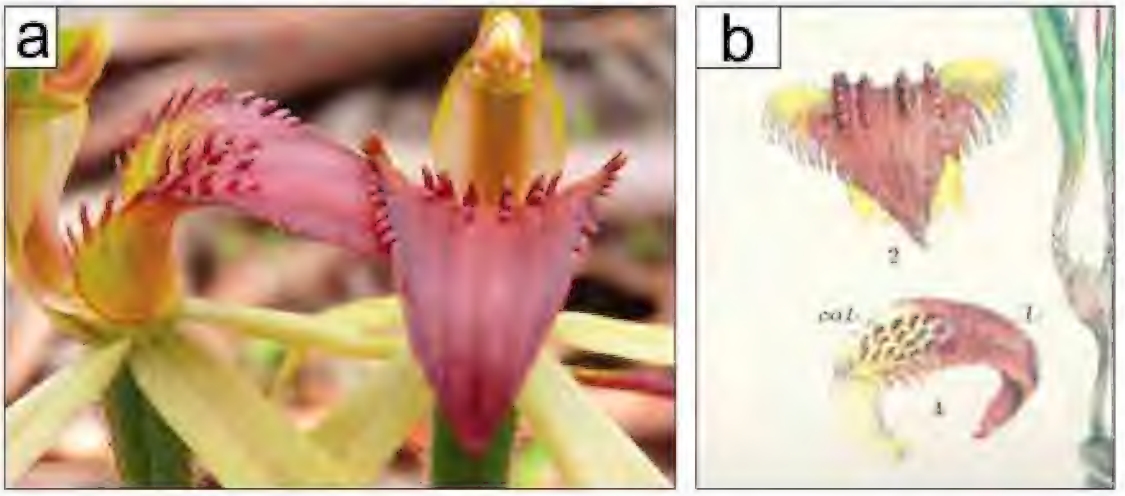


Figure 5. Differences in labellum shape, profile, distal protrusion, lateral cross sections, teeth number, cast and placement in: a. *C. montana*, Cobungra; b. *C. fitzgeraldii*. (Photo: a: W. Kosky, b: adapted from Fitzgerald (1876)).

Table 3. Key characteristics distinguishing *Caladenia montana* from *C. fitzgeraldii*.

Characteristic	*C. montana*	*C. fitzgeraldii*
Labellum shape	Obscurely 3-lobed, mid-lobe protruding forward markedly (forming an oblique platform) before decurving.	Unlobed (but deflexed margins and/or teeth can give an obscurely 3-lobed appearance), the distal section protruding forward moderately (without forming an oblique platform) before decurving.
Labellum lateral cross section	At widest point moderately to deeply concave, its margins (including teeth) elevated. Flattens somewhat into mid-lobe.	At widest point moderately to shallowly concave. Margins and teeth in mid-section where teeth begin usually mildly decurved to flaccid, less often horizontal, and rarely a continuation of concave upsweep. Flattens somewhat towards apex.
Number of calli rows	6 (~70% of plants) with outer rows often short. 4 in ~30% of plants.	Mostly 4.
Reticulate venation	Most light to heavy. Some without.	Most without. Some with light venation.
Teeth pairs	Mean 13.4 Typically 10–16 pairs.	Mean 9.06 Typically 7–12 pairs.
Teeth placement and form	Beginning elevated on rise from base, longer linear to acinaciform, longest 1–2(–3) mm, then decrescent and horizontal, shorter, broader, incised to just into mid-lobe.	Confined to mid-section of the side margins, beginning on or after the top of the rise from the base, short linear to serrate, longest 0.5(–1) mm, decrescent. Teeth mostly decurved, sometimes horizontal, rarely elevated.
Clubs	Variable. Light to heavy. Well to poorly defined. Some flattened, channelled or tail-like; occasionally tailed.	Reasonably consistent. Most light to moderately heavy, terete, well-defined.
Lateral sepal length	(2–)2.5–4.5(–6) cm.	2–4(–4.5) cm.
Detectable odour	Strong burnt plastic odour on hot days.	None.

Arachnorchis oreophila D.L.Jones, *Austral. Orchid Res.* 5: 55–56 (2006); *Caladenia oreophila* (D.L.Jones) G.N.Backh., *Victorian Naturalist* 124: 124 (2007). Type: New South Wales. Beside the Monaro Highway, south of Hopping Joe Creek, 4.x.2004, *D.T. Rouse 201* (holo CANB 656585!; iso MEL 2330125!).

The type of *Caladenia fitzgeraldii* (Rupp 1942) is based on Fitzgerald's plate illustrating three plants (two sharing the same sheath and collar) which Fitzgerald had identified as *C. clavigera*. (Fitzgerald 1876). In the notes accompanying his illustration, Fitzgerald gives the location of the plants as '*near Mudgee*'.

Caladenia oreophila (as *Arachnorchis oreophila*) (Jones 2006b) is based on a collection from 'New South Wales. Beside the Monaro Highway, south of Hopping Joe Creek' and its distribution given as *'Known only in the upper reaches of the eastern branch of the Cann River in south-eastern New South Wales and just over the border in adjacent areas of Victoria […] Alt. 450–480 m'*. The labellum teeth of the four pressed flowers in this type material, which includes a dissected flattened labellum mounted on a small card (Figure 6e), are short, linear to serrate, all beginning at or after the top of the rise from the labellum base and confined to the mid-section of the labellum margins. The labella bear 9 ±1 teeth pairs. These, the other characteristics of the type collection,

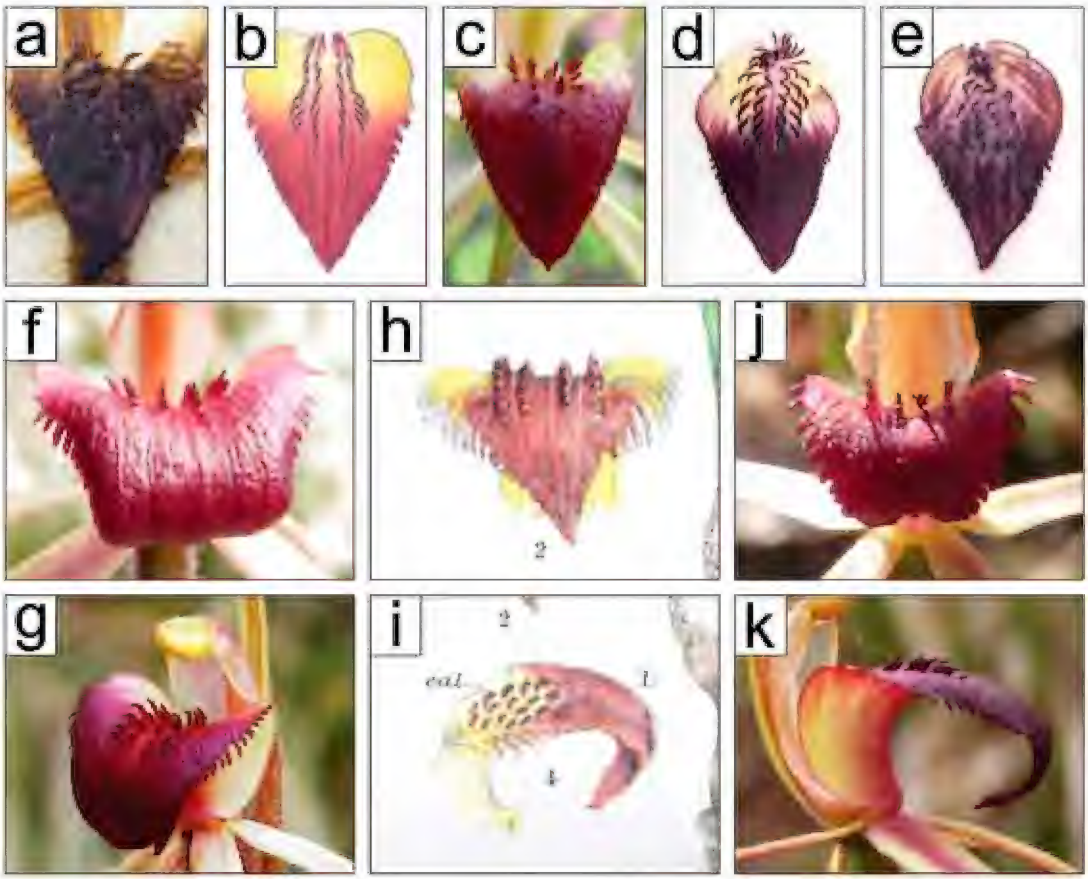


Figure 6. *Caladenia fitzgeraldii* labella images from the NSW Central Tablelands (CT), East Gippsland, ViC. (EG) and adjacent parts of south-eastern NSW (SE NSW). a. Genoa River, SE NSW, vicinity of *C. osmera* type locality, ex Rupp's personal collection, determined by N.A. Wakefield as *C. fitzgeraldii* (NSW51320); b. Kandos, CT. John Riley's illustration "C" (Riley & Banks 2002: 59); c. Goongerah, EG; d. Mt Canobolas, CT, determined as *Arachnorchis fitzgeraldii* (CANB 680293); e. *C. oreophila*, type locality Monaro Highway, SE NSW, detail from holotype (CANB 656585); f. Knocker, EG, nine teeth visible on left side; g. Mt Canobolas, CT, ten teeth on right side, supplied as *C. fitzgeraldii*; h-i. Labella details from Fitzgerald's (1885) illustration, near Mudgee, CT: h, with nine marginal teeth pairs, some longer than avarage, i: with eight or nine teeth (detail partly obscured by highlights); j–k. Labella from the *C. oreophila* type locality, with nine teeth pairs and nine teeth on the left side respectively (Photos: a-f, j-k: W. Kosky, g: C. Bower, h-i: adapted from Fitzgerald (1885)).

and indeed Jones's description of *C. oreophila*, consistently place this taxon within the established morphology of *C. fitzgeraldii*.

Northern distribution

The recorded northern distribution of *Caladenia fitzgeraldii* is the New South Wales Central Tablelands (Mudgee, Wellington, Lithgow, Bathurst and Orange districts). From this region, representative examples include Fitzgerald's type illustration from near Mudgee (Figure 6h–i), Riley's illustration (Riley & Banks 2002: 59) of *C. fitzgeraldii* from Kandos (Figure 6b), plants of *C. fitzgeraldii* photographed at Mt Canobolas (Figure 6g), a further photo of *C. fitzgeraldii* (as *Arachnorchis*) from the same location by Jones (2006a: 70), two separate Rupp specimens from Dripstone (45 km west of Mudgee) now held at NSW (NSW 651327, NSW 651328) determined by Rupp himself as *C. fitzgeraldii,* and those of the present author from the Central Tablelands held at CANB, determined as *Caladenia fitzgeraldii*.

Southern distribution

The known southern distribution of *Caladenia fitzgeraldii* (including the populations referred to by Jones as *C. oreophila*, included here within *C. fitzgeraldii*) encompasses E. Gippsland, Victoria, and the south-east corner of New South Wales, including the Australian Capital Territory. Prior to 2014, *C. fitzgeraldii* was only known to the author in Victoria from three locations: the Victorian population Jones refers to as *'just over the border'* from the *C. oreophila* type site; north of Lakes Entrance (several sites near Watershed Road); and the Knocker north of Omeo, with a specimen record from Diggers Hole track near the Buchan River Crossing, 12 km north-west of Gelantipy (MEL 1554925). Following the extensive 2014 bushfires north of Orbost, good populations of both *C. fitzgeraldii* and *C. montana* were found around Yalmy and Goongerah, midway between the coast and the Dividing Range. At all these locations, *C. fitzgeraldii* grows with or in close proximity to *C. montana*.

Ecology/Phenology

In Victoria, *Caladenia fitzgeraldii* grows in reasonably open to somewhat dense, often grassy or heathy mountain Eucalypt forests. It has a sparse distribution across the 250–1200 m elevation range. It usually flowers after fire, or slashing, after which it declines in subsequent regrowth. At lower elevations, it flowers in August, September and October, but November into December at higher elevations. Below 250 m, the similar *C. peisleyi* occupies habitats comparable to that of *C. fitzgeraldii*.

Notes

A photographic sample from 110 plants of *Caladenia fitzgeraldii* was collated from Victorian and near-Victorian locations, including 13 plants from at or near the *C. oreophila* type locality. Matching plants from the same locations are illustrated in Backhouse *et al.* (2016), Turner *et al*. (2014) and Jones (2006b) as *C. oreophila.* A comparison of all these plants with Fitzgerald's type illustration, the New South Wales Central Tablelands representative examples, and specimens of *C. fitzgeraldii* from south-eastern New South Wales and Victoria shows that all plants have a consistent set of common distinguishing characteristics. Examples of *C. fitzgeraldii* labella is provided in Figure 6: a–e show near identical, unlobed labella morphology, while f–k show marginal teeth (and adjacent labellum edge) decurved to flacid, none erect, and how this trait can create the impression that these labella are obscurely three lobed.

Selected Specimens Examined: New South Wales: Bondi State Forest. A few km N of Victorian border on Monaro Highway, 1.5 km S of Hopping Joe Creek crossing, 12.xi.2004, *D.T. Rouse 201* (Holotype of *Arachnorchis oreophila,* CANB 656585); Maragle SF 17.xi.2004, *P.G. Branwhite 266* (CANB); Brindabella Road opposite entrance to Brindabella National Park, 16.xi.2004, *D.L. Jones 19168* (CANB); Lithgow, fire trail running E. of Little Hartley Rd, 2.x.1998, *C. Bower ORG 1589* (CANB); Cultivated ex Lees Mtn, Canobolas, SF 12.ix.1998, *C. Bower ORG 1524* (CANB); Mt Canobolas 10.xi.1963, *B. Whitehead s.n.* (CBG 8103540 [at CANB]); Ilford-Rylstone Rd between Charbon and Kandos, 7.x.1999, *G. Bradburn ORG 2738* (CANB); Escort Rock, Eugowra 22.ix.1963. *W.E. Giles ?s.n?* (NSW 651332); Cann Valley Hwy. Xi.1992, *R.G. Tunstall ORG 1352* (CANB); **New South Wales ex Rupp's Herbarium of Australian Orchids:** Dripstone, N.S.W. x.1945, *G.W. Althofer s.n.* (NSW 651328); Dripstone, N.S.W. ix.1945, *G.W. & P. Althofer s.n.* (NSW 651327); Extreme S.E. of N.S.W. near Genoa River, ix.1940, *N.A. Wakefield ?s.n.?* (NSW 651320); **Victoria:** Cann Valley Hwy. South of Winnots Creek, *ca.* 40km N of Cann River, xi.1992, *R.G. Tunstall* ORG 1354 (CANB); The Knocker 11.xi.1999 *P.G. Branwhite 79* (CANB); East Gippsland. Buchan River at Diggers Hole Track crossing 6 km

south west of Mt. Seldom Seen, 3.xi.1986, *S.J. Forbes 3202* (MEL); Hillside above Yalmy Road, 800 metres west of Pinnak Road, 20.2 km NNW of Orbost, 21.ix.2014 *J. Turner 2021* (MEL); Near ridge top off Watershed Road, 8.ix.2014, *J. Turner 2019* (MEL); *1.3km up Watershed Track from Reformatory Road, C. 11km NW of Nowra Nowra 27.ix.2015 R.D. Phillips 373* (MEL).

Caladenia montana and *C. osmera*

Caladenia montana G.W.Carr, *Indig. Fl. Fauna AssoC. MisC. Pap.* 1: 10 (1991). Type: Nunniong Plateau area, Reedy River valley above gorge, 13.xi.1964, *J.H. Willis s.n.* (holo MEL 1532470!).

Arachnorchis osmera, D.L.Jones, *Austral. Orchid Res. 5*: 56-57 (2006*); Caladenia osmera* (D.L.Jones) G.N.Backh., *Victorian Naturalist* 124: 124 (2007). Type: Victoria. Cemetery Track, *ca.* 1.2 km N of Leslies Track, Noorinbee North State Forest, 4.x.2004, *D.T. Rouse 200* (holo CANB 656586!).

Caladenia montana was named without a detailed taxonomic description but with good notes on many of its distinguishing features (Carr 1991), including its *'broad labellum* [...] *projected forward distally to form an oblique platform'* and a representative type bearing two single-flowered plants, one with and one without petal clubs, with provenance from *'below Brumby Point, Nunniong Plateau area, +/- 3000 feet'* [914 m] (MEL 1532470). The further nomination of three representative specimens, two from alpine regions above 1000 m elevation and one given only as from Cann River (*N.A.Wakefield* 2741; MEL 1508361), allows one to readily identify this species. MEL holds four specimen sheets of *C. montana* from coastal E. Gippsland (Lakes Entrance to Genoa), including the cited Cann River specimen.

The type locality for *Caladenia osmera* (= *Arachnorchis osmera*) is 'the north end of Cemetery Track, Noorinbee North State Forest', approximately 15 km north of Cann River township (Jones 2006a). Its distribution is given in the protologue as 'East Gippsland from Lakes Entrance to Genoa, extending to border areas of south east New South Wales', and its elevation range given as 10–490 m.

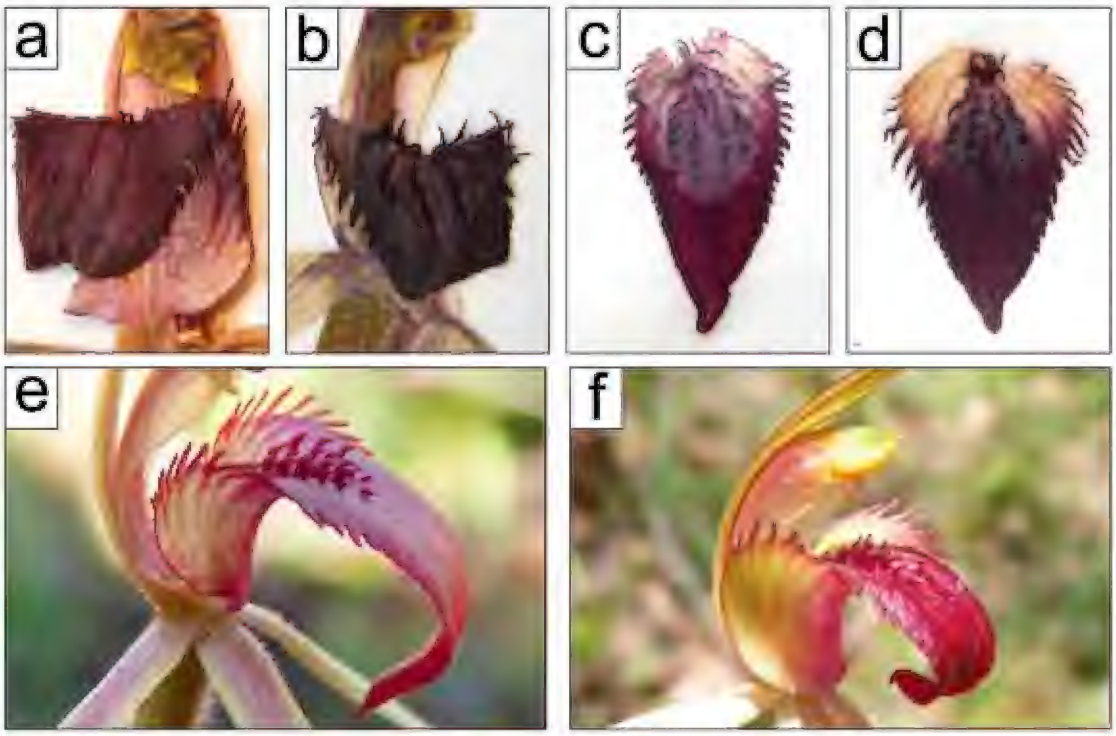


Figure 7. Various *Caladenia montana* labella. a. Detail of *C. montana* type, below Brumby Point, Victoria (MEL 153247); b. Part of *Arachnorchis osmera* type, Noorinbee, Victoria (CANB 656586); c. *A. montana*, Maragale, NSW (CANB 656014), note that side lobes are folded**;** d. *A. osmera*, Betka River, Mallacoota ViC. (CANB 3641); e-f. Labella showing the shape and placement of teeth, with mid-lobe "*projected forward distally to form an oblique platform*" as described by Carr (1991), e: from a robust plant, *C. osmera* type site, Noorinbe, 280 m elevation, f: smaller plant, Mt Stewart, 700 m elevation (Photos: a-f: W. Kosky).

Jones's description of *C. osmera* is consistent with that of *C. montana* encountered at all elevations, save that Jones indicates its labellum lateral lobes as being erect, with 8–11 pairs of teeth, and its mid-lobe with *'7–10 pairs of very short reddish teeth decrescent and forming an irregular marginal band towards the apex.'* Studies of specimens referred to as *C. osmera* do not support the suggestion of an '*irregular marginal band*' of small teeth toward the apex of the labellum as a feature of the species. The type collection comprises two plants with longer erect linear labellum teeth beginning on the rise from the base (i.e. part way into the side lobes), becoming shorter and broader, incised and horizontal part way into the mid-lobe, but not extending to the apex, one with 12 pairs of teeth (Figure 7b), the other with 11 teeth visible from one side, with a fold that appears to hide a few additional teeth. This is consistent with the average population teeth count of 13.4 for *C. montana*. Both Carr's and Jones's descriptions refer to the plants' particular odour, in both cases said to be reminiscent of burnt plastic.

Distribution

In Victoria *Caladenia montana* occurs in undisturbed to lightly disturbed forested areas in E. Gippsland, from the Eastern Alps to the E. Gippsland coastal foothills and west through the Great Dividing Range to Mt Tamboritha, Licola, Cathedral Ranges and Mt Samaria. It also occurs in south-east New South Wales and the Australian Capital Territory.

Ecology/Phenology

Caladenia montana grows in reasonably open grassy or heathy, mountain, foothill, and coastal Eucalypt forests from the coast to 1500 m elevation. At lower elevations it flowers from August–October, at higher elevations into November, December and early January. It flowers well after fire, but persists and flowers periodically in more open locations without fire.

Notes

It is not apparent whether, or how, Jones distinguished *Caladenia osmera* from *C. montana*, other than perhaps by treating *C. montana* as *'restricted to higher montane areas'*, given as 700–1000 m elevation (Jones 2006a). However, field studies and examinations of all accessible records establish that, in E. Gippsland, *C. montana* extends from alpine areas to the coast without any significant elevational separation or indeed any discernible morphological change. For example, a direct comparison of a sample of plants from the *C. osmera* type locality at 280 m elevation with *C. montana* plants from the Knocker at 960 m elevation showed that, within the range of variation exhibited by plants at both sites, they were clearly of the same taxon.

Caladenia montana was thoroughly documented photographically, capturing 333 plants across 22 populations extending from 1500 m elevation (the Victorian Eastern Alps west to Mt Tamboritha) through to the E. Gippsland coast. The sample set included 81 plants from near-coastal regions within the range of Jones's distribution of *C. osmera,* including 32 plants from at or near the *C. osmera* type locality. Whilst considerable secondary, often random, trait variation occurs both within and across populations, including different mixes of ancillary traits, these traits were found to be present in all populations. Moreover, all these populations, along with the type and specimens examined by Jones also studied as part of this work, demonstrate a consistent set of primary traits and mixes of ancillary variable traits that place them within the range of natural variation exhibited by *C. montana*. All populations of 20 or more plants have remarkably consistent mean teeth pair counts of 13.4 $\pm$1 (Table 2).

The principal characteristics of *Caladenia montana* labella are illustrated in Figure 7.

Selected Specimens Examined: Australian Capital Territory: Orroral, Upper Cotter 4.xi.1960, *N.T. Burbridge ?s.n.?* (NSW 651324)**;** Track to Nursery Swamp 26.x.2003 *D.L. Jones s.n.* (CANB 475170); **New South Wales:** 5 km along Two Sticks Road, Brindabella Valley. 16.xi.2004, *D.L. Jones 19142* (CANB); Maragle SF 17.xi.2004, *P.G. Branwhite 265* (CANB); Monaro Hwy, Bindi SF, a few (1-2) kms north of Victorian border. 1.x.2005, *D.R. Rouse 252* (CANB); **Victoria:** East Gippsland. Cann River, Spring 1947, *N.A. Wakefield 24719* (MEL); Above Bonang Road 5.2 km north of Goongerah, 28.ix.2014 *J. Turner 2021* (MEL); By old track up hillside not far from Bonang Road 2 km south of Goongerah School, 23.x.2014, *J. Turner 2043* (MEL); Betka River, 30.ix.1990, *A.D. Bishop J112/9-11* (CANB); The Playground below Cobberas No.1., 28.xii.1976, *E.W. Finck* ?s.n? (MEL); Cobungra, xii.1927, *H. Morgan s.n.* (MEL 1597954); Diggers Hole track, near Buchan River crossing. East Gippsland, 15.xi.1989. *K. Hill 3686* (NSW).

Caladenia flavovirens and *C. aestiva*

Caladenia flavovirens G.W.Carr, *Indig. Fl. Fauna AssoC. MisC. Pap. 1*: 5 (1991). Type: Montrose, Dandenong Ranges, Victoria, 7.xii.1980, *J. Eichler s.n.* (holo MEL 1532457!).

Caladenia beaugleholei D.L.Jones, *Austral. Orchid Res.* 2: 16 (1991). Type: Victoria; Gorae West near Portland, 14.xii.1942, *A.C. Beauglehole s.n.* (holo MEL 578984!)

Caladenia aestiva D.L.Jones, *Austral. Orchid Res.* 2: 14 (1991). Type: Victoria; Benambra-Wulgulmerang Rd, 7.i.1970, *A.C. Beauglehole 33327*, *K.C. Rogers & E.W. Finck* (holo MEL 652783!).

Caladenia flavovirens was published without any description beyond what was necessary to distinguish it from *C. pallida* Lindl. (Carr 1991), which Carr noted as being *'endemic in Tasmania'.* He indicated that *C. flavovirens* was *'widespread in the forest of the eastern highlands of Victoria'.* To establish the features that characterise *C. flavovirens* as a species, one is obliged to rely on Carr's type collection and representative specimens.

The *Caladenia flavovirens* type collection, from 'Montrose, Dandenong Ranges, Victoria' (MEL 15324570) [elevation *ca.* 300 m], is a double-flowered plant presenting tepals with round, relatively broad, filamentous distal portions that are longer than the broader basal part and more or less sparsely covered with osmophores. The top flower has dorsal and right-hand lateral sepals with slightly thickened indistinct clubs. The plant's other tepals are tailed (Figure 8a). Carr's representative specimens include: plants bearing flowers with tailed sepals, e.g. specimens from Mt Drummer (MEL518552) [300 m elevation] and Mt.

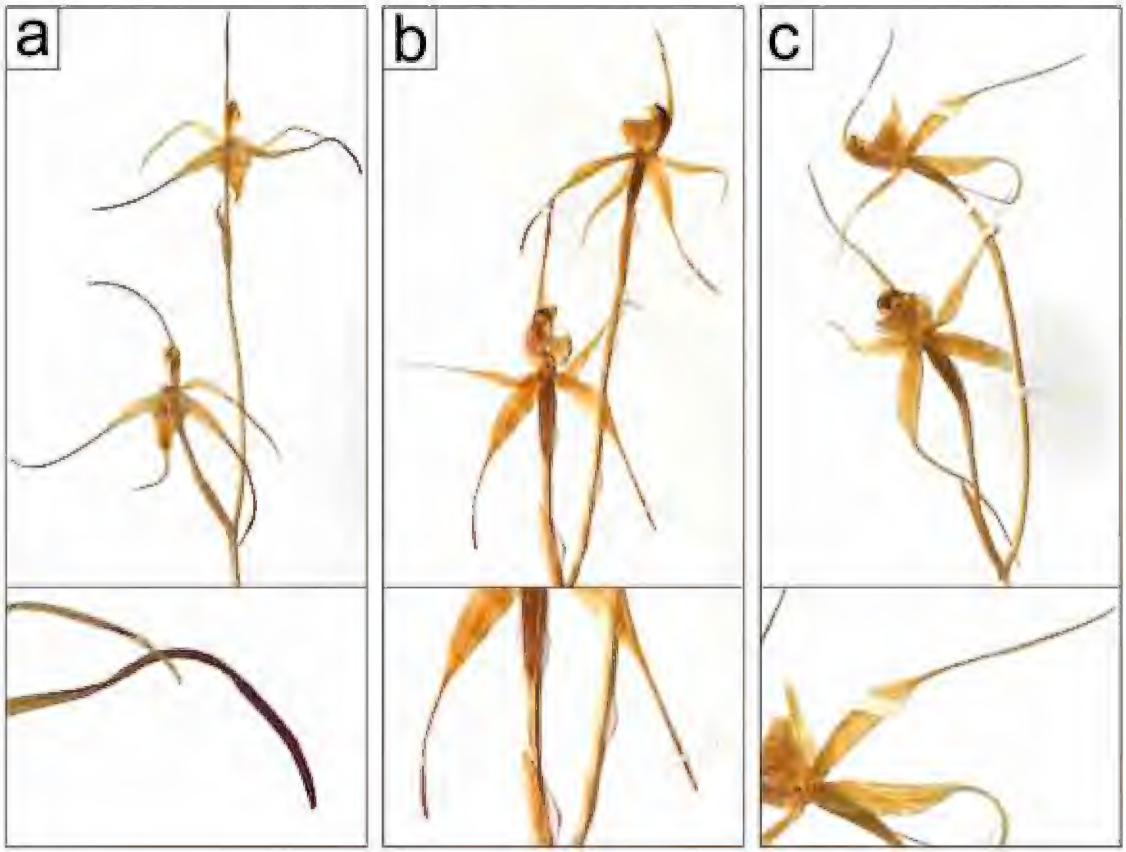


Figure 8. a. Detail of *Caladenia flavovirens* type material Montrose (MEL15324570); b. Detail of *C. aestiva* type material, Benambra-Wulgulmerang Rd, Wulgulmerang West (MEL 652783); c. Jones's representative specimen of *C. aestiva* from the Montrose type locality of *C. flavovirens* (MEL 2149601). The subtle differences between the tepal endings on these specimens is best assessed by viewing the actual specimens under magnification (Photos: a-c: W. Kosky).

Cobbler (MEL 578989) [900 m elevation]; a sheet of two single-flowered plants from Boronia with clubbed dorsal sepals and petals and indistinctly clubbed to tailed lateral sepals (MEL578990) [100 m elevation]; and a sheet bearing two single-flowered and one double-flowered plants from Ringwood (MEL578982) [90 m elevation]. One of the single-flowered plants on the latter sheet has well-defined heavy sepal clubs (Figure 9d), while the other has relatively thick sepal tails. The double-flowered plant has tepals that are hard to determine as either clubbed or tailed. Carr subsequently determined as *C. flavovirens* an indistinctly clubbed specimen from the Brindabella Ranges, New South Wales, 4,750 ft [1448 m elevation] (MEL646902).

In the protologue of *Caladenia aestiva* (Jones 1991), variation in floral morphology is noted as follows (the term '*osmophore*' is used therein to describe clubbed osmophore formations, i.e. the entire club rather than an individual gland). The perianth is described as having dorsal sepals *'linear in proximal half then abruptly tapered to a linear-filiform channelled cauda ca 0.5 mm wide, either glandular throughout with sessile, dome-shaped to clavoid glands or thickened into a brown or green terminal osmophore* [...] *Lateral sepals* [...] *oblong-lanceolate to lanceolate in proximal half then abruptly narrowed to a linear-filiform, cauda (either entire or with a terminal osmophore), similar to that on the dorsal sepal. Petals* [...] *usually glandular near apex, sometimes with a terminal osmophore similar to those on the sepals. Labellum* [...] *obscurely three-lobed* [...] *lateral lobe [with] marginal calli scimitar-shaped,* [...] *mid-lobe* [...] *margins with numerous, short, tooth-like calli, decrescent towards the apex'*. The accompanying drawing (Jones 1991, Figure 14) has a flower with well-defined heavy sepal clubs, the accompanying photo of a plant from Wulgulmerang with a well-defined, light dorsal sepal club, and tailed lateral sepals and petals.

The *Caladenia aestiva* type collection from Benambra-Wulgulmerang Rd (MEL 652783) consists of three plants with four flowers, their lateral sepals with osmophore formations that vary from light, well-defined clubs to barely thickened indistinct formations that are hard to attribute as either tailed or clubbed (Figure 8b). Jones's 'Selected Collections' include the Mt Cobbler tailed specimen (MEL 578989) Carr selected as representative of *C. flavovirens* and a tailed specimen from the *C. flavovirens* type locality at Montrose (MEL 2149601) (Figure 8c), which is a good match to the *C. flavovirens* type specimen.

Distribution

Caladenia flavovirens is currently only known from five locations in Victoria, viz: Montrose (where its continued presence is in doubt) and Healesville in the Dandenong Ranges, and Cobungra, the Cobberas and Wulgulmerang in the Eastern Alps. There are reliable records of it from the Upper Yarra/Boronia/Ringwood district, the Portland district, Mt Cobbler east of Mansfield and Mt Drummer and Omeo in E. Gippsland, however, searches in recent times have not found plants at any of these locations. There are two records from the Australian Capital Territory, namely a 1981 record of a single plant from the Namadgi National Park not seen since its discovery, and a 1962 sheet bearing four plants from Mt Murray. The only record from New South Wales is a 1970 specimen from the Brindabella Ranges. Many records in the form of herbarium specimens have, on close examination, proven to be of other species.

Ecology/Phenology

Caladenia flavovirens grows in reasonably open grassy or heathy Eucalypt forests in the 90–1500 m elevation range. At all elevations, it flowers from mid-December to mid-January.

Thynnid wasps have been observed to be attracted to the tepal osmophores and labella of *Caladenia flavovirens* at Cobungra South and Wulgulmerang, and in one instance one was photographed grappling with an indistinctly clubbed tepal, pseudocopulating with its labellum, and removing and departing with its pollen (Kuiter 2015, and Kuiter pers. comm.). Both Kuiter and the author have documented, at both locations, that Thynnid wasps and other insects consume secretions formed on the labellum teeth and calli of *C. flavovirens* plants.

Notes

Carr and Jones's respective characterisations and nominated specimens of *Caladenia flavovirens* and *C. aestiva* encompass plants with the same population-wide sets of morphological variation across a 90–1500 m elevation range. In each case, the specimens bear

flowers with tailed sepals, clubbed sepals, and others that are not easily defined as either. In describing *C. aestiva*, Jones described plants from Carr's designated populations of *C. flavovirens* as a new species in spite of the continuous range of variation that *in situ* studies of *C. flavovirens* populations show. The name *C. aestiva* clearly sits in synonymy with *C. flavovirens*, which has priority as the earlier of the two published names.

Across its range, *Caladenia flavovirens,* (including *C. aestiva*) is characterised by its: labellum without reticulate venation; relatively large flowers on inflorescences 20–40 cm tall, lateral sepals (2–)3–4.5(–5.5) cm long, tepal osmophores sessile, spherical to obovoid, grouped densely to sparsely distally, becoming

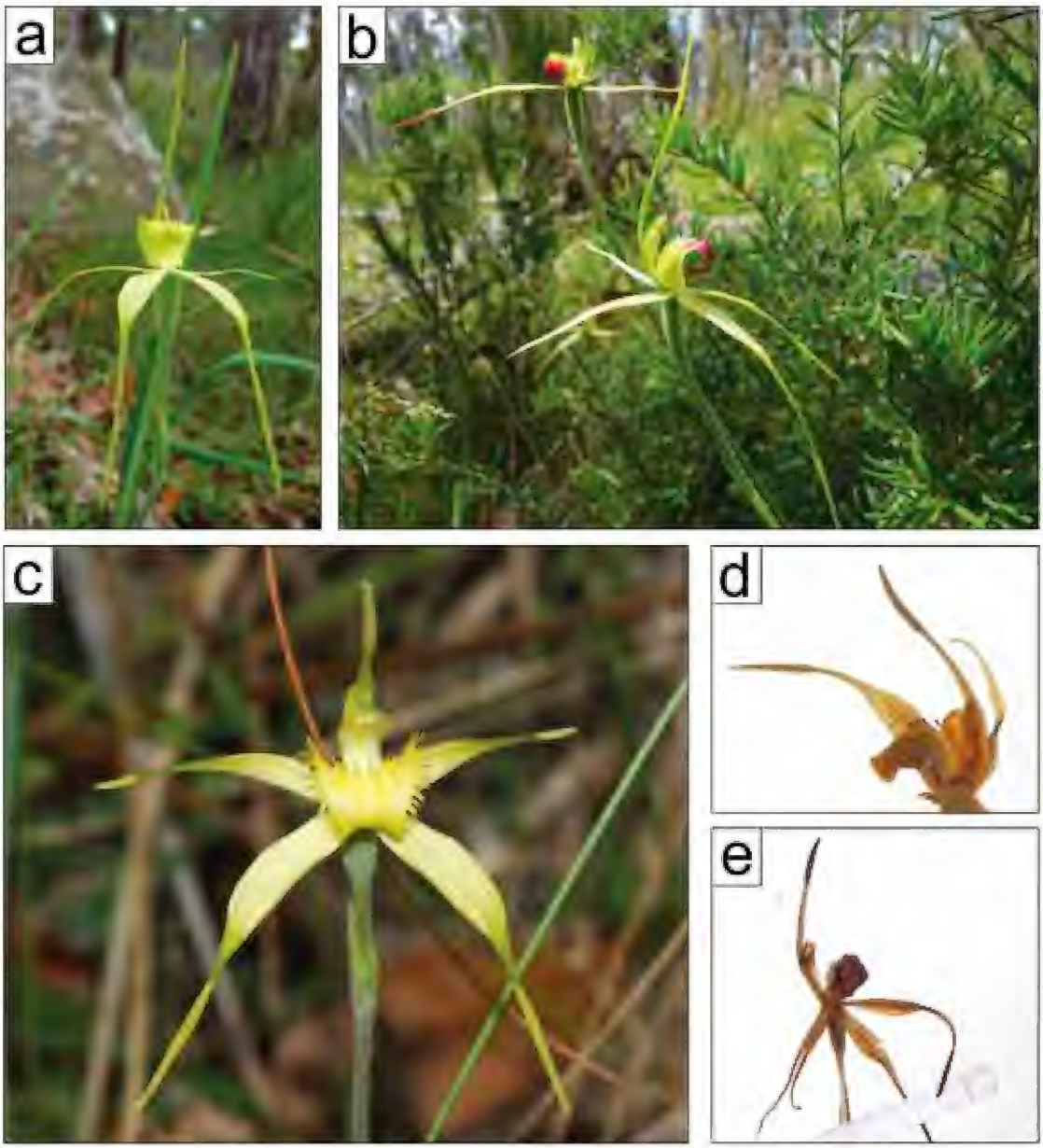


Figure 9. *Caladenia flavovirens* flowers. a. With relatively thick-tailed sepals, Montrose; b. With lightly clubbed sepals, Cobungra South; c–e. With distinct, heavy sepal clubs, c: also with clubbed petals, Montrose, 2011, d: detail of Ringwood material (MEL57898), e: detail of Box Hill material (MEL 2169604) (Photos: a-b, d-e: W. Kosky, c: W. Probert).

sparser proximally, rarely clustered (Figures 1a, 1b, 2), the extent of osmophore coverage of the distal section of the lateral sepals amounting to greater than half the sepal length; labellum obscurely 3-lobed, teeth beginning near the base, to a greater or lesser degree acinaciform and decrescent to the apex, those on the side lobes varying between broader, shorter, somewhat serrate teeth, to longer narrower somewhat linear teeth (Figure 9); ovary at anthesis *ca.* 10–15 mm long, *ca.* 3–4 mm wide, the ovary and the abaxial surface of the tepals near base with white/transparent glandular hairs, the glands sometimes red; effulgent flowers that are yellow to green, with a host of different colour highlights, typically reds to shades of orange, tan or brown on the labellum mid-lobe, teeth, calli, and clubbed or tailed tepal ends; flowering in December and January. Its known distribution includes coastal foothills to alpine regions, from the Dandenong Ranges to E. Gippsland, with outlying records from Portland and the Brindabella Ranges (NSW and ACT), and a typical habitat of sheltered ridges and slopes in usually grassy, open forest.

Careful examination of the *Caladenia flavovirens* populations in and around the Mt Dandenong area, Wulgulmerang, the Cobberas and at Cobungra South consistently found a highly variable mix of plants with clubbed and tailed tepal end formations. The clubbed formations are only occasionally distinctive, well-defined heavier clubs, more often well to poorly-defined light clubs, while many exhibit only a very slight thickening of part of the lateral sepal ends (indistinct clubs) that are hard to attribute as either tailed or clubbed (see, e.g. Figures 1a, 1b, 2, 8, 9).

Conservation Status: Good records of *Caladenia flavovirens* exist for 18 subpopulations which, at their peak, contained an estimated total population of 800 plants. Today it is only known from five locations, with a total population of no more than 250 plants. Occurrences of this order satisfy the IUCN Red List CR (Critically Endangered) Criteria C.2a,b(i,ii,iv,v), (IUCN 2012). This taxon is listed as critically endangered under the Victorian Flora and Fauna Guarantee Act.

Selected Specimens Examined with approximate elevation in metres in square brackets: **Australian Capital Territory**: Bendora Arboretum, Brindabella Ranges, 29.xii.1981, *C. Bower, s.n* (CBG 9703064.10) [900 m]; **New South Wales:** Along the track to Lewra Track from Lewra Gap, Brindabella Range, 14.i.1970, *R. Filson 11467* (MEL) [1450 m]; **Victoria:** Montrose, Dandenong Ranges, 7.xii.1980, *J. Eichler s.n.* (Holotype of *Caladenia flavovirens* MEL 15324570) [300 m]; Benambra-Wulgulmerang Rd, 7.xi. 1970, *A.C. Beauglehole 33327* (Holotype of *Caladenia aestiva* MEL 652783) [1000 m]; Gorae West, 14.xii.1942, *A.C. Beauglehole s.n.* (Holotype of *Caladenia beaugleholei* MEL 578984) [150 m]; Vicinity of Mt. Cobbler, i.1933, *D. Mathews s.n.* (MEL 578989) [900 m]; Mt. Drummer below Princess Highway, about 12 miles east of Cann River; R. Melville, 2843 (MEL) [90 m]; Ringwood19.xii.1927, *W.H. Nicholls s.n.* (MEL 578989) [300 m]; Western slopes of Mt. Dandenong, just above Montrose, 28.xxi.1947, *A.B. Court s.n.* (MEL 2149601) [290 m]; Boronia, xii.1930, *D. Paton ?s.n.?* (MEL 5789900) [A100m]; Box Hill, xii.1899, *C. French Jnr.,s.n.* (MEL 2169604) [100 m].

Caladenia valida

The basionym of this taxon is *Caladenia reticulata var. valida* Nicholls (1943). In elevating *C. valida*, Clements & Jones (1989) designate plate 251 in Nichols (1969) as the lectotype.

Backhouse *et al.* (2016) and Turner *et al.* (2018) treat the clubbed spider *Caladenia* at Raymond island as a separate taxon, however, a direct comparison of plants from there with the type illustration of *C. valida,* and plants from the type locality (Portland district), shows a good match with the Raymond Island plants, albeit with some differences in the incidence of different forms of tepal osmophore formation. In the absence of any published descriptions of the Raymond Island plants as a distinct taxon, this study regards that difference as sitting within the circumscription of *C. valida*, as per VicFlora (2019). For further details, see the supplementary notes available on the *Muelleria* web page.

Caladenia turneri Kosky sp. nov.

Diagnosis: ***Caladenia turneri*** shows an affinity with *Caladenia montana* but has a proportionally shorter, moderately protruding labellum, fewer labellum marginal teeth ((6–)9–14(–15) pairs), and generally smaller habit and flowers.

Type: Victoria, Gippsland: Winkie Creek, 15 km NNE of Briagolong, 24.x.2016, *J.R. Turner 3000* & *W.A. Kosky* . (holotype MEL 2402981, MEL 2402982 (spirit)).

Other specimens examined: Victoria: NW of Lees Creek Track, 1.35 km from Freestone Creek Road, 21.5 km north of Briagolong, 24.ix.2016, *J.R. Turner 2098* & *W.A. Kosky* (MEL).

Illustrations: Turner *et al.* 2014, p.39 (as *Caladenia* aff. *montana,* Freestone Creek); in Backhouse *et al.* 2016, pp. 151, 152 (as *Caladenia* Turner's form).

Description: Hirsute, tuberous, terrestrial *herb* (1)–20–30(–35) cm tall, scape not elongating in fruit, growing singly or in small groups of scattered plants. *Leaf* solitary, lanceolate, (8–)10–15(–20) cm long, 4–8 mm wide, patent, dull green, base red to purple-blotched; with an indumentum of hairs on both surfaces, hairs fine, eglandular, 4–6 mm long. *Scape* erect, 12–30 cm long, stem *ca.* 1.5 mm in diameter, terete, green with red flush to mostly green or mostly red, with fine eglandular hairs mostly to 4 mm long, but to 6 mm near base, the pedicel also with short hairs tipped with red spherical glands. *Sterile bracts* 1.2–2.2 cm long, closely sheathing stem, upper part sometimes divergent, ovate-oblong, acute, external surface with fine eglandular hairs; *fertile bract* 1.2–2.2 cm long closely sheathing pedicel, upper part sometimes divergent, external surface with fine eglandular hairs. *Ovary* at anthesis *ca.* 10 mm long, *ca.* 2 mm wide, green, covered with short hairs, these tipped with red spherical glands. *Flowers* 1, rarely 2, 3.5–5 cm across, overall pale yellow to pink, very rarely entirely yellow-green; *dorsal sepal* erect to incurved, petals and lateral sepals stiffly spreading, deflexed; *tepals* pale yellow to pink, usually with red veins, abaxially near base with short hairs tipped with red spherical glands; *tepal ends* with distinct, thickened, terete or channelled to flattened dark red clubs formed by densely packed sessile spherical osmophores (sometimes absent on petals); *dorsal sepal* 2–3.5 cm long, 2–3 mm wide basally then tapering to a thickened club 6–12 mm long; *lateral sepals* 2–3.5 cm long, 2–3 mm wide in the basal half, abruptly narrowing and then tapering to a thickened round, flat or channelled club 6–12 mm long; *petals* 1.5–2.5 cm long, 1–2 mm wide in the basal half gradually tapering to an acute apex with around 25% of population with a thickened club and 25% with a sparser

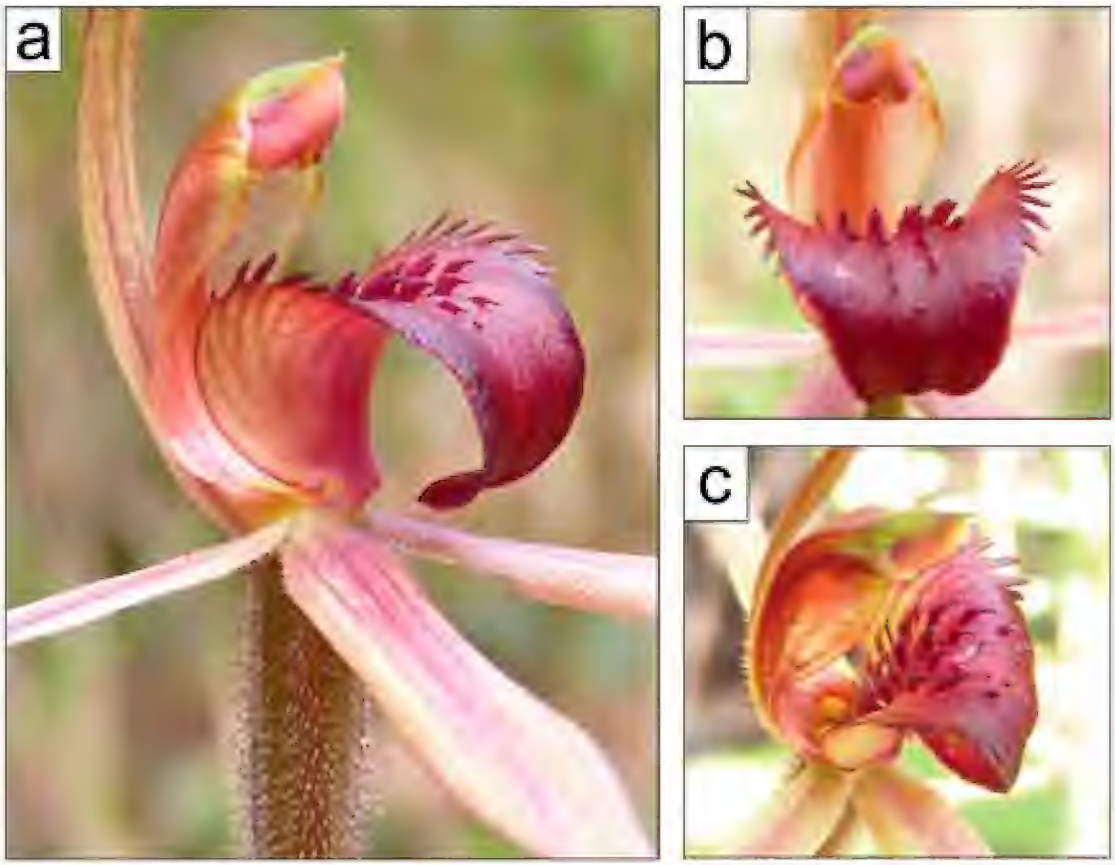


Figure 10: Labella and column detail in *Caladenia turneri*. a. from near Lees Creek, side view; b. front view; c. elevated view (Photographs: a-c: W. Kosky).

cover of osmophores in the distal 3–7 mm; *labellum* stiffly articulated on a short hinge *ca*. 1.5 mm wide just above its axis, 9–12 mm long, 6–9 mm wide and ovate when flattened, the rounded base to the widest point considerably shorter than the irregularly triangular distal section, obscurely 3-lobed, base shallowly concave, side lobes obliquely erect, mid-lobe mostly flat, narrowing to the acute apex that is rolled under in an open curve, glossy dark red with a short, pale yellow or pink base sometimes with red radial branching stripes; *labellum marginal teeth* typically 9–14 pairs (average of 94 plants: 10.7 pairs) narrow, linear, *ca*. 1.3 mm long, dark red, erect to obliquely erect before the top of the rise from the base (being the highest part of the elevated labellum edge, and the widest when flattened), progressively decreasing in length, broadening and becoming incised and horizontal; mid-lobe margin usually entire from *ca*. half way or less towards apex, occasionally irregularly serrate or serrulate; *labellum lamina calli* in four rows, dark red, extending from the base to the mid-lobe base, or often extending well onto the mid-lobe, basal calli stalked, curved, often with slightly flattened apices, the longest *ca*. 1.5 mm long, progressively decreasing in size and becoming thicker and sessile towards mid-lobe, distal calli often reduced to tiny rounded projections. *Column* 11–15 mm long, 2–3 mm wide, incurved, with partially transparent wings broadening towards the apex, variably greenish or reddish, with two yellow ovoid basal glands at its base; *anther ca*. 2 mm long, *ca*. 2 mm wide, with a short acute rostrum; *pollinia* 4, in two flat, joined pairs, yellow; *stigma* elliptic; *ca*. 2 mm wide, sunken; *capsule* not seen (Figures 10, 11).

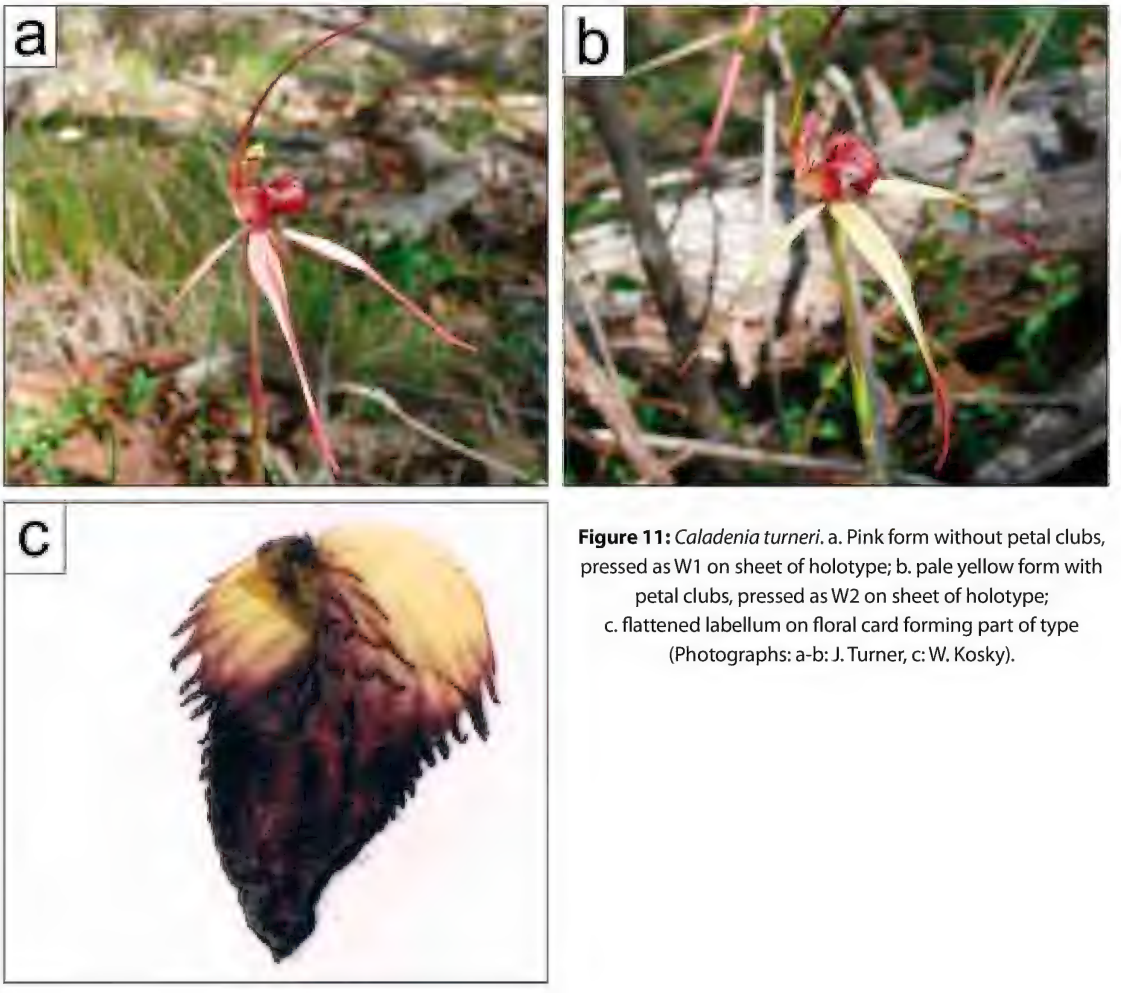


Figure 11: *Caladenia turneri*. a. Pink form without petal clubs, pressed as W1 on sheet of holotype; b. pale yellow form with petal clubs, pressed as W2 on sheet of holotype; c. flattened labellum on floral card forming part of type (Photographs: a-b: J. Turner, c: W. Kosky).

Distribution and Habitat: *Caladenia turneri* is known only from the upper Freestone Creek catchment in the foothills of the Great Dividing Range north of Briagolong, in Gippsland, Victoria, at an elevation of 170–370 metres. The species occurs in the *Shrubby Dry Forest* to *Shrubby Damp Forest* Ecological Vegetation Class (DSE 2004), usually in reasonably open areas. Associated species include *Eucalyptus bridgesiana* R.T.Baker, *E. croajingolensis* L.A.S.Johnson & K.D.Hill, *E. cypellocarpa* L.A.S.Johnson, *E. macrorhyncha* F.Muell. ex Benth; *E. polyanthemos* subsp. *vestita*, Schauer, *Acacia dealbata* Link, *Acrotriche serrulata* (Labill.) R.Br., *Bossiaea prostrata* R.Br., *Leucopogon fletcheri* subsp.*brevisepalus* J.M.Powell, *Phyllanthus hirtellus* Müll.Arg, *Poa labillardierei* Steud., *Caladenia parva* G.W.Carr, *C. peisleyi* (D.L.Jones) G.N.Backh., *Pterostylis alpina* R.S.Rogers, *P. nutans* R.Br. and *P. peduculata* R.Br.

Ecology/Phenology: Over summer, *Caladenia turneri* plants persist as dormant tubers. Given suitable seasonal conditions plants emerge as leaves in winter, with mature plants forming buds which flower from mid-September to mid-October. In dry years, plants in a given subpopulation may not emerge at all, but remain dormant for one or more years until favourable conditions return. Pollination is thought to be effected through the sexual deception of males of a parasitic thynnine wasp species which have been observed to be attracted to its flowers, but not observed removing pollen (pers. obs, and in Kuiter (2015: 38–38), where *C. turneri* is there misidentified as *C. brachyscapa*).

Notes: *Caladenia turneri* is a small to medium-sized clubbed spider *Caladenia* that can be distinguished from other clubbed spider *Caladenia*, principally by its moderately projecting, obscurely 3-lobed ovate labellum with an mean of 10.7 pairs of linear marginal teeth (typically 9–14 pairs amongst 89% of 94 measured plants, with a minority in the 6–15 pair extreme range), initially erect before the top of the rise from the base, and subsequently decrescent, becoming horizontal up to halfway into the mid-lobe, usually with four full rows of lamina calli, and by a combination of secondary characteristics namely: flowers with rather rigid, relatively narrow petals and sepals, the sepals with thickened, well-defined, terete, channelled or flattened clubs, about half of the plants with shorter petal clubs, and a mixture of both pale yellow and pink to red flowers; and an indumentum of fine hairs to 6 mm long on the leaf and base of the stem.

The determination of *Caladenia turneri* as a distinct species was based on detailed examination of fresh specimens in the field and careful analysis of photographs of 107 plants from three disjunct populations between 2010 to 2016. *Caladenia turneri* is most similar to *C. montana* which is generally larger, usually 25–45(–50) cm tall; with lateral sepals (2.5–)3–4(–6) cm long and a larger, obscurely 3–lobed, labellum (11–18 mm long, 6–11 mm wide), the mid-lobe protruding further forward to form an oblique platform before decurving, with a mean of 13.4 teeth pairs (10–16 pairs amongst 87% of 236 flowers measured, the remainder with 5–26 pairs); as in *C. turneri*, teeth begin on the rise of the labellum base up to half way into the mid-lobe, but are linear to acinaciform proximally, decrescent and incised distally, the majority with 6, not always full, rows of calli. *Caladenia montana* has not been encountered in the upper Freestone Creek catchment. It occurs further to the north and east, the nearest record being *ca*. 40 km away. *Caladenia turneri* is superficially similar to *C. fitzgeraldii* which, with a mean teeth count of 9.06 is reasonably close to that of *C. turneri* (10.7). However, *C. fitzgeraldii* is usually 15–40 cm tall; has lateral sepals 2.5–4 cm long, a labellum 10–15 mm long and 6–11 wide, being essentially intermediate in size between *C. turneri* and *C. montana*. It is readily distinguished from *C. turneri* by its unlobed labellum, its teeth being confined to the mid-section of its side margins beginning on or after the rise from the base, and short decurved to horizontal, rarely elevated (see Figure 5). The nearest record of *C. fitzgeraldii* is *ca*. 80 km east of the upper Freestone Creek catchment. At two sites, but not at its type locality, *C. turneri.* grows close to or alongside *C. peisleyi*, another related species. That species has a relatively short, stubby, unlobed ovate labellum 6–9 mm long and 5–8 mm wide, with fewer teeth pairs (mean 7.66, with 4–10 pairs amongst 80% of 113 flowers measured, the remainder in the 2–15 range) beginning on or after the top of the rise from the base and confined to the mid-section of the labellum margin. Plants of *C. peisleyi* are usually 15–30 cm tall, lateral sepals (1.5–)2–3(–3.5) cm long. No obvious hybrids or intergrades between these species have been observed.

Conservation Status based on IUCN Categories and Criteria, IUCN (2012): *Caladenia turneri* is only known from a population of *ca.* 90 mature plants in three disjunct subpopulations. Its known area of occupancy is less than 5 km^2. All known subpopulations are on Crown Land, part of the Briagolong State Forest. Surveys for clubbed spider *Caladenia* throughout Gippsland have failed to find the species anywhere outside the Freestone Creek catchment. It is likely that more plants are to be found in the extensive area of suitable habitat surrounding the type locality, as well as potentially elsewhere in unsurveyed pockets of similar habitat within the catchment, much of which is difficult to access. Its population is estimated to be greater than 150 but fewer than 500 individuals. In dry seasons, the number of mature plants is greatly reduced; extensive searches during the dry 2019 growing season by members of the Bairnsdale and Districts Field Naturalists Club only found 10 flowering plants at the Lees Creek subpopulation site and none at the other two sites (J. Turner, pers. comm). Even so, assessments of the known subpopulations over time show that numbers appear to be reasonably stable. That said, all subpopulations occur along the base and lower slopes of gullies with roads or rough tracks traversing them; parts of these subpopulations have been subject to direct disturbance, and thus population decline is likely from road making, forest fire management activities and resultant silting. Given the ongoing nature of these activities, in particular extensive forest fire management verge clearing in forests in the region, the single location of the population is likely to further decline unless these activities either cease or are modified to prevent further damage to the known subpopulations and potential habitat. Therefore, *C. turneri* satisfies IUCN 3.1 Red List CR (Critically Endangered) Criteria B1ab(ii,iii)+2ab(i,ii,iii) (IUCN, 2012).

Etymology: Named after eminent East Gippsland field naturalist James Robert Turner (1938–) who first documented and collected this species.

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Supplementary Material

Supplementary notes and tables can be downloaded from the *Muelleria* web page. Any additional data is available from the author on request.

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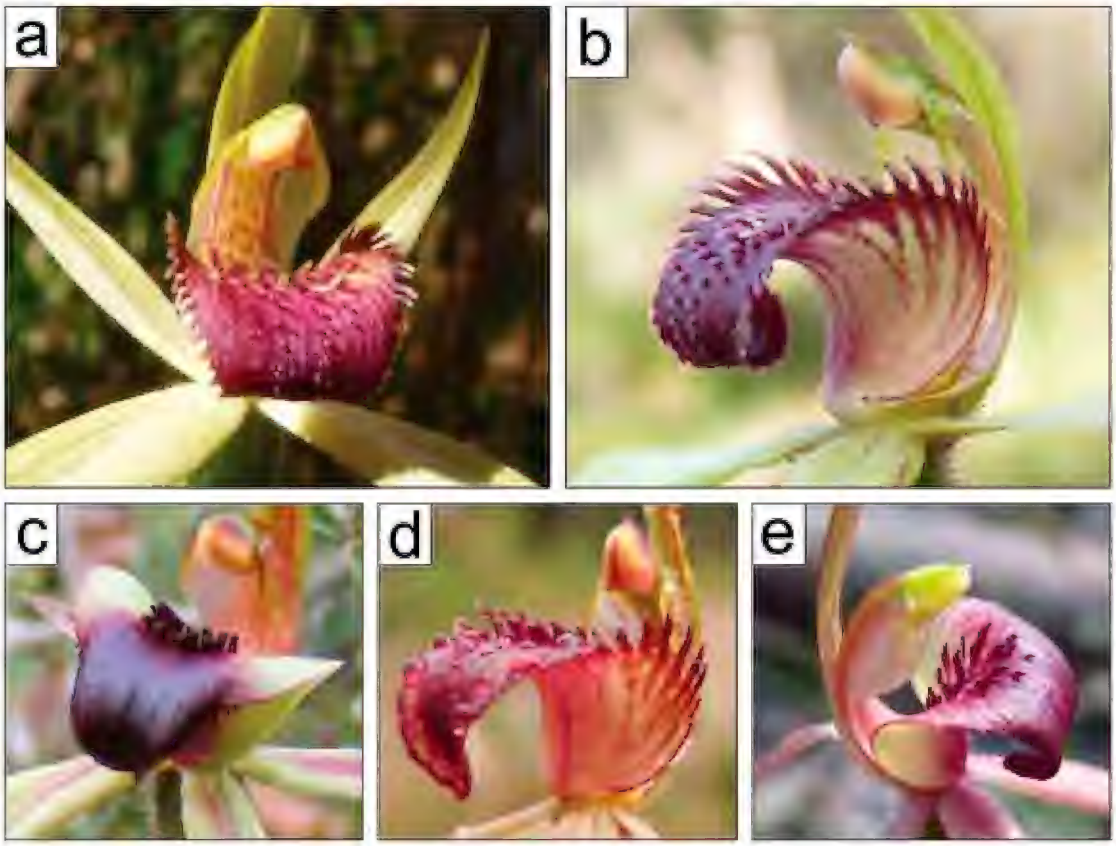

Figure 12. a. *Caladenia valida,* Raymond Island; b. *C. ancylosa*; C. *c. clavigera*; d. *C. australis; e. C. peisleyi* (Photos: W. Kosky).

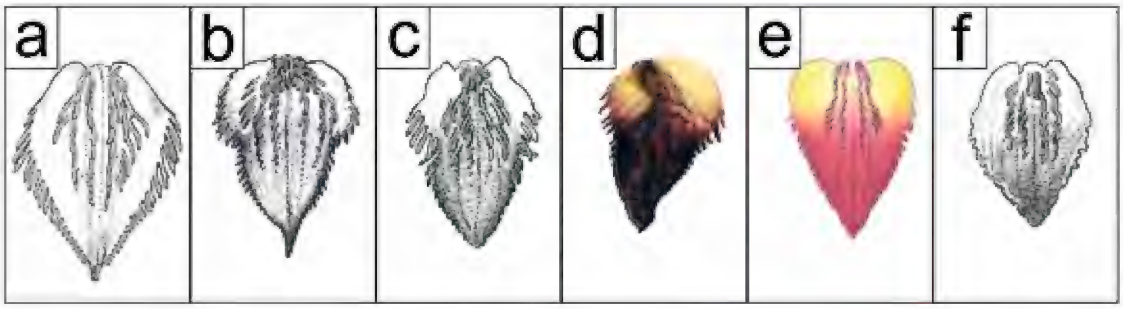

Figure 13. Labellum images showing relative size, flattened labellum shape, and teeth size, form and arrangement. a. *Caladenia flavovirens*. This taxon is obscurely 3-lobed with slight but distinct mid- and side lobes usually more prominent than illustrated, and acinaciform to somewhat linear teeth; b. *C. australis*. Longer side lobe teeth are typical; c. *C. montana*; d. *C. turneri*. The labellum is distorted when flattened; e. *C. fitzgeraldii*. Teeth are variable from serrate, as shown, to shortly linear; f. *C. peisleyi*. Teeth are variable from serrate as shown to linear (Images: a-c, f: adapted from Walsh & Entwisle (1994), where *C. montana* and *C. peisleyi* are labelled as labellum variants of *C. fitzgeraldii*, d: W. Kosky, e: adapted from John Riley's illustration "C" in Riley & Banks (2002: 59)).

Key to East Gippsland's Clubbed Spider *Caladenia*

Clubbed spider *Caladenia* are distinguished from other spider *Caladenia* by the following combination of characteristics:

(a) Two yellow glands present at the base of the column;

(b) Tepal osmophores that are sessile, spherical to obovoid, forming dense to sparse sepal end formations which, usually, but not always, exhibit some thickening of the underlying sepal tip, forming thickened tepal ends ('clubs') —as opposed to a more open grouping of osmophores scattered further along sepals without noticeable tepal end thickening ('tails'); and

(c) The absence of green, comb-like side lobe margins.

In the following key, mean teeth pair counts are provided in some cases along with the typical range of teeth pairs in order to provide an indicator of variation that may be encountered in the field. The average count will rarely vary by more than ±1 for groups of 20+ flowers, or ±2 for smaller numbers of flowers.

1 Labellum with erect, more or less uniform, acinaciform to somewhat linear edge teeth beginning near the base, descending in size to the tip; mid-lobe rolled under into a half to full circle 2

1 Labellum without uniformly shaped teeth extending to the tip; mid-lobe or front section decurved and loosely rolled under, roll usually no more than a half circle 4

2 Summer flowering. Flower colours effulgent, pale yellow to light green often with red, orange or tan features. Labellum without red stripe/s or veining. Tepals without central red stripe. Filiform distal section of lateral sepal >half total length, some with tailed tepals ..... ***C. flavovirens***

2 Flowering late winter to spring. Flower colour not effulgent. Labellum with red veining. Tepal abaxial surface with central red stripe/s, fainter or absent on adaxial surface. Filiform distal section of lateral sepals < half total length 3

3 Petals erect when flower fully open. Labellum with very light to moderate red veining ..... C. ***valida***

3 Petals not erect when flower fully open. Labellum with moderate to heavy, dark red veining ..... ***C. ancylosa***

4 Labellum cordate. Lateral sepals with or without tiny clubs 2–3 (rarely–5) mm long ..... ***C. clavigera***

4 Labellum not cordate. Lateral sepals with clubs >3 mm long 5

5 Labellum distinctly 3-lobed, when flattened the rounded base to the widest point considerably shorter than the irregularly triangular distal section, teeth pair mean 17, typical range 12–20 for 81% of plants ..... ***C. australis***

5 Labellum obscurely 3-lobed, or not lobed 6

6 Labellum obscurely 3-lobed, when flattened the rounded base to the widest point considerably shorter than the irregularly triangular distal section, erect edge teeth beginning before the top of the rise from the base, thereafter shortening, broadening and incised horizontal, extending up to half-way along mid-lobe 7

6 Labellum unlobed, with a short fringe of linear to serrate teeth confined to middle of its edge beginning at, or after, the top of the rise from the base, thereafter decrescent up to half-way into the front section 8

7 Labellum mid-lobe protruding forward markedly to form an oblique platform before decurving, teeth near base linear to acinaciform, teeth pair mean 13.4, typical range 10–16 for 87% of plants ..... ***C. montana***

7 Labellum mid-lobe protrudes forward moderately (without forming an oblique platform) before decurving, teeth near base linear, not acinaciform, teeth pair average 10.7, typical range 9–14 for 89% of plants ..... ***C. turneri***.

8 When flattened, the rounded base of the labellum to the widest point considerably shorter than the triangular distal section, unflattened the distal section protrudes forward moderately (without forming an oblique platform) before decurving, teeth decurved to horizontal, rarely erect, teeth pair average 9.06, typical range 7–12 for 77% of plants ..... ***C. fitzgeraldii***

8 When flattened, the rounded base of the labellum to the widest point more or less the same length (or marginally shorter) than the triangular distal section, unflattened the stubby distal section does not protrude forward before decurving, teeth erect to horizontal, teeth pair average 7.7, typical range 4–10 for 80% of plants ..... ***C. peisleyi***

Additional useful characteristics for species identification

C. flavovirens: Labellum often with red mid-lobe and other red, orange or tan features. Lateral sepals usually with a lighter cover of osmophores forming red, brown, yellow or green, thickened clubs, to unthickened glandular tails. A variety of tepal osmophore formations often haphazardly arranged on flowers in a population. Leaf a lighter green and slightly hairier than that of other East Gippsland spider *Caladenia*, base green, occasionally with faint purple hue. A beautiful orchid with a variety of vibrant colour forms. Open grassy forest. Usually: 20–40 cm tall; lateral sepals (2–)3–4.5(–5.5) cm long. (Figure 13a)

C. valida: Tepals yellow cream to whitish, often with red suffusion, or subtle pink or green hues. Labellum with or without red mid-lobe. Lateral sepals usually with round clubs, otherwise variable; well defined (light to heavy) to poorly defined, occasionally tailed. Petal clubs rare. Grows in sandy coastal woodland in or near bracken. Flowers August to October. Usually: 20–40 (–60) cm tall; lateral sepals 2–4.5 cm long. (Figure 12a)

C. ancylosa: Tepals greenish yellow cream to white. Labellum base cream to white, mid-lobe, a dull, dark blackish red. Teeth and calli both a dull blackish red with pale tips. Lateral sepals usually with terete red or brownish clubs (some tan, green or yellow), many with a sparse cover of osmophores, otherwise clubbing varies between well defined (light to heavy) and poorly defined, some sepal ends tailed. Petals without osmophores, usually red-tipped. Grows in grassy woodland in clay/loam soils. Flowers September to November. Usually: 20–40(–50) cm tall; lateral sepals 2–4 cm long. Flowers with a light scent (Jones 2006b). (Figure 12b)

C. clavigera: Labellum cross section at widest shallowly concave; mid lobe margins, including any teeth, flaccid or decurved. Transition to mid-lobe edge usually with a few tiny (to 1 mm long) indistinct teeth, often obscured, sometimes serrulate or entire. Labellum 10–12(–14) mm long, *ca.* 9 mm wide. Usually 15–25 (–35) cm tall; lateral sepals 1.5–3 cm long, with or without tiny clubs. Petal clubs absent. *Caladenia clavigera* is routinely said to form hybrids with *C. montana*, particularly after fire. This study has established that *C. clavigera* × *C. montana* hybrids are extremely rare, and that most plants said to be such hybrids are in fact *C. fitzgeraldii*, which may appear superficially intermediate between *C. clavigera* and *C. montana*. (Figure 12c)

C. australis: Labellum margins with linear to somewhat acinaciform teeth beginning erect on the rise from the base, and decrescent and horizontal to well into mid lobe, occasionally irregularly serrulate towards the tip. Labellum apex with short concave acuminate tip; red veining absent to light, rarely heavy. Lateral sepals, usually with terete clubs, otherwise clubbing varies between well defined (light to heavy) and poorly defined, some sepal ends tailed. Labellum 12–15 mm long, *ca.* 10 mm wide. Usually 20–40 cm tall; lateral sepals 2.5–4.5(–5.5) cm long. (Figures 12d, 13b)

C. montana: Considerable variation in size. Lateral sepals with round, flat or channelled clubs, varying from well defined (light to heavy) to poorly defined or tailed; some osmophore formations unusually long (to half sepal length, *ca.* 2+ cm on large flowers). Labellum 11–18 mm long, 6–11 mm wide. Usually 25–45 (–50) cm tall, red veining light to heavy, occasionally absent; lateral sepals (2.5–)3–4(–6) cm long. Emits strong burnt plastic odour, but only on hot, usually humid, windless days, which are infrequent at higher elevations. (Figure 13c)

C. turneri: A mix of yellow and pink hued flowers. Tepals stiffly held. Lateral sepals usually with well-defined, reasonably heavy, terete, flat, or channelled clubs. Labellum 9–12 mm long, 6–9 mm wide. Usually 20–30 cm tall; lateral sepals 2–3.5 cm long, red veining absent to light, rarely heavy. (Figure 13d)

C. fitzgeraldii: Labellum front section usually with somewhat flaccid decurved margins and teeth often creating the impression of three lobes, teeth reasonably uniform, red veining absent to light, rarely heavy. Lateral sepals usually with terete, light to medium-heavy, well-defined clubs. Labellum 10–15 mm long, 6–11 wide. Usually 15–40 cm tall; lateral sepals 2.5–4 cm long. (Figure 13e)

C. peisleyi: It is a characteristic of this species that there is considerable variation in teeth placement, length and shape in any small patch of plants. Lateral sepals usually with round, light to medium-heavy, well-defined clubs. Labellum 6–9 mm long, 5–8 mm wide. Usually 15–35 cm tall; lateral sepals (15–)20–30(–3.5) long, red veining absent to light, rarely heavy. (Figure 12e, 13f)

All except *Caladenia clavigera* and *C. ancylosa* will, to a greater or lesser degree, and more-so after fire, have some flowers with osmophores on their petal ends.

The flowers of *Caladenia australis, C. clavigera, C. fitzgeraldii, C. montana, C. peisleyi* and *C. turneri* have more or less the same basic colour combinations, namely: white to creamy-yellow tepals and labellum base; tepal abaxial surface with central reddish stripe/s, prominent to faint or absent on adaxial surface; labellum apex and clubs red/burgundy; some flowers with pink, green or yellow hues; some overlaid with a strong red hue. Leaves, stems and other parts are generally similar bar any particular differences in indumentum indicated. Leaves are green and moderately hairy, with a purple base. Leaf size is not indicative of eventual plant size at anthesis. All occur in forest to open woodland habitat, some in more open grassy, sedgy or heathy areas. All species flower from August to October at lower elevations. At higher elevations (up to *ca.* 1500 m), *C. clavigera*, *C. fitzgeraldii* and *C. montana* flower through to November and December, with *C. montana* flowering into January at some sites.

Muelleria

40: 31–38

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ROYAL BOTANIC GARDENS VICTORIA

The lichen genus *Enterographa* Fée (Roccellaceae) in Tasmania

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Introduction

This paper continues the author's studies of the lichen family Roccellaceae in the broad sense, which hitherto have dealt with new taxa and revisions of *Angiactis* Aptroot & Sparrius (Kantvilas *et al.* 2020a), *Bactrospora* A.Massal. (Kantvilas 2004), *Cresponea* Egea & Torrente (Kantvilas 2020a), *Lecanactis* Körb. (Kantvilas 2021), *Lecanographa* Egea & Torrente (Kantvilas 2004), *Mazosia* A.Massal. (Kantvilas 2020b) and *Ocellomma* Ertz & Tehler (Kantvilas *et al.* 2020b). Here the focus is *Enterographa* Fée, a genus of about 35 species, rich in highly localised taxa found chiefly in tropical and oceanic areas. These occur on bark, rocks or living leaves, or are lichenicolous on foliicolous lichens.

A world revision of the genus was published by Sparrius (2004), who dealt with nine taxa present in Australia. Additional species were added by McCarthy & Elix (2002, 2016, 2018), bringing the total number from Australia and its offshore islands to 12, of which only one, *E. bella* R.Sant., is listed for Tasmania (McCarthy 2020). Five species are known from New Zealand, of which two are shared with Australia (Galloway 2007). In this paper, five species are recorded for Tasmania of which four are shared with other areas of Australasia. Three represent new records for the island, and a further species is described as new to science. All are relatively uncommon and, like most species of the Roccellaceae, are usually found in relatively sheltered, stable microhabitats, often in climax and/or relict vegetation communities.

Abstract

Five species of *Enterographa* Fée from Tasmania are treated: the foliicolous *E. bella* R.Sant., the corticolous *E. divergens* (Müll.Arg.) Redinger, and three saxicolous species, *E. cretacea* P.M.McCarthy & Elix, *E. subgelatinosa* (Stirt.) Redinger, and *E. ophiolithica* Kantvilas, the last being new to science. The new species is known only from Tasmania and is characterised by a whitish thallus that lacks lichen substances, black apothecia, 0.15–0.4 mm long, and by the (3–)5–7(–8)-septate ascospores, 20–30 x 4–6 µm.

Keywords: lichenised Ascomycetes, new species, new records, taxonomy

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Material and methods

The study is based mainly on specimens housed in the Tasmanian Herbarium (HO) and field observations by the author. Morphological and anatomical investigations were undertaken on hand-cut sections of the thallus and apothecia, using standard methods, reagents and stains: water, 10% KOH (K), Lactophenol Cotton Blue, ammoniacal erythrosin and Lugols Iodine (I). Amyloid reactions where sections were pre-treated in K, rinsed in water and then mounted in I are described in the text as KI. Calcium oxalate was detected by eluting thin sections with 20% H_2SO_4. Measurements of ascospores are based on at least 50 observations per taxon and are presented in the format 5th percentile–*average*–95th percentile, with outlying values in brackets. Routine chemical analysis was undertaken using standard methods (Orange *et al.* 2010).

Taxonomy

Generic characters

Enterographa is characterised by a crustose, ecorticate thallus containing calcium oxalate in the medulla. The photobiont is either trentepohlioid, with roundish or ellipsoid cells in clusters or short chains, or *Phycopeltis* where the cells are ±oblong, and form radiating plates. The apothecia are lirelliform, with or without a thalline margin, or punctiform and grouped in pseudostromata, with a brown to black, usually slit-like and enclosed disc. The proper exciple is cupulate in section, very highly reduced, composed of loosely interwoven hyphae inspersed with crystals, and is poorly differentiated from adjacent tissues. The hypothecium is hyaline to pale yellowish brown. The 8-spored asci approximate the *vulgata*-type (Torrente & Egea 1989) and have a non-amyloid wall and tholus except for a highly reduced amyloid ring that becomes compressed into a thin sheet in older asci (Figure 1). The paraphysoids are richly branched and anastomosing and lack swollen apices. Ascospores are transversely multi-septate, hyaline, narrowly ellipsoid to fusiform, with a gelatinous halo at least when young, and with cylindrical locules. The immersed pycnidia produce bacilliform to filiform, curved or straight conidia. The non-carbonised exciple distinguishes *Enterographa* from *Dirina* Fr., *Sclerophyton* Eschw. and *Opegrapha* Ach. The most closely related genus is probably *Mazosia* (Ertz *et al.* 2015, Sparrius 2004), which has generally roundish apothecia with a distinctly layered proper exciple, and, in the Tasmanian species, 3-septate ascospores with an enlarged uppermost median cell (Kantvilas 2020b). Also similar is *Austrographa* Sparrius, which differs chiefly by having a carbonised hypothecium (Sparrius *et al.* 2010).

Enterographa bella **R.Sant.**

Symb. Bot. Ups. 12(1): 106 (1952).

Thallus pale greyish to ± translucent, very thin, mostly in small circular spots 0.4–1 mm wide that merge into colonies to 10 mm wide when well-developed; *medulla* KI–, inspersed with minute crystals; *prothallus* absent. *Photobiont Phycopeltis*. *Apothecia* lirelliform, to 0.5–1 mm long, straight, curved or serpentine, occasionally branched, mostly one per small thallus, surrounded by a pale orange-pink thalline margin; *disc* slit-like; exciple orange-brown, obscuring the disc. *Hypothecium* hyaline, 10–15 µm thick. *Hymenium* 55–70 µm thick, diffusely pale brown in the upper part; *asci* ± ellipsoid, 43–52 x 17–25 µm. *Ascospores* transversely 7-septate,

Key to the species

1 Thallus foliicolous; photobiont *Phycopeltis* ..... ***E. bella***
1: Thallus corticolous or saxicolous; photobiont trentepohlioid 2
2 Thallus corticolous ..... ***E. divergens***
2: Thallus saxicolous 3
3 Thallus greenish grey, C+ red and/or P+ yellow (gyrophoric and psoromic acids); apothecia red-brown ..... ***E. subgelatinosa***
3: Thallus white, with all spots tests negative; apothecia blackish 4
4 Thallus thick, with a pruina of calcium oxalate, containing dehydroconstipatic acid; apothecia occurring in stellate clusters, to 2 mm long ..... ***E. cretacea***
4: Thallus thin, epruinose, lacking lichen substances; apothecia scattered, often punctiform or if elongate then <0.4 mm long ..... ***E. ophiolithica***

20–*25.1*–29.5(–31) x (3.5–)4–*4.6*–5(–5.5) µm. *Conidia* not seen in Tasmanian specimens, reported as bacilliform, 4–6 x 1.5–2 µm. Chemical composition: psoromic acid, typically in trace amounts due to the thinness of the thallus and therefore not detectable by spot tests. Figure 2A.

Remarks: This is the only foliicolous member of the genus in Tasmania, first recorded by McCarthy *et al.* (2001). It is restricted to a single locality: a narrow, relict corridor of *Atherosperma*-dominated rainforest in a landscape dominated by dry sclerophyll forest. Here it is relatively abundant on the leaves of *A. moschatum* and *Parsonsia straminea*. The orange-brown, often serpentine lirellae make this species very attractive and eye-catching. This species is also known from Victoria and New Zealand (Sparrius 2004).

Specimens examined: **TASMANIA:** Track to Cape Surville, 42°57'S 147°59'E, 110 m, 2000, *G. Kantvilas* 404/00 (HO); *ibid.*, 2014, *G. Kantvilas* 471/14 (HO).

Enterographa cretacea P.M.McCarthy & Elix

Telopea 19: 138 (2016). Type: Australia, New South Wales: 5 km N of Bermagui, Camel Rock, 36°22'41"S 150°04'37"E, alt. *c.* 3 m, on sheltered quartzitic sandstone on the seashore, above the splash zone, 10 February 2016, *P.M. McCarthy* 4475 (holotype – CANB!).

Thallus chalky white, minutely scabrid and pruinose due to an overlying layer of calcium oxalate crystals, lumpy and uneven, to 1.5 mm thick, sometimes ± lobate at the margins, forming irregularly roundish, undelimited patches to 20 mm wide; *medulla* densely inspersed with angular crystals to 15 µm wide, patchily

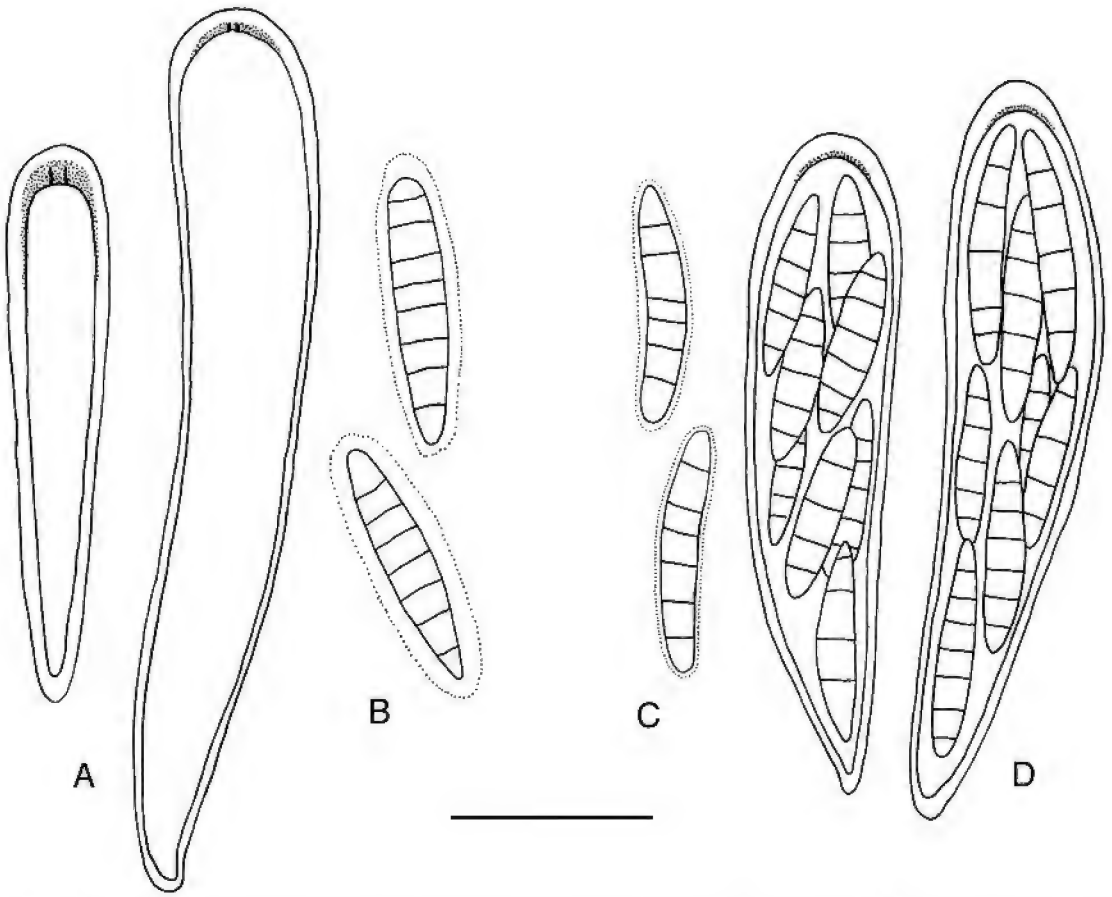

Figure 1. Asci and ascospores of *Enterographa* (with amyloid parts after pretreatment in K stippled). **A.** *E. divergens*, with immature ascus (left) and sub-mature ascus (right); note the reduction of the amyloid area and the darker-staining ring. **B.** *E. divergens* ascospores in K, with a highly swollen gelatinous halo. **C.** *E. ophiolithica* ascospores in K, with a thin halo. **D.** *E. ophiolithica* mature asci, with the amyloid area compressed into a thin sheath. Scale = 20 µm.

KI+ blue; *prothallus* absent. *Photobiont* trentepohlioid. *Apothecia* initially ± ellipsoid, soon lirelliform, 0.2–2 mm long, simple or branched, curved or straight, at maturity aggregated in stellate clusters and typically radiating from a central point within roundish, convex, stroma-like thalline lumps to 5 mm wide; *disc* brown-black, slit-like or open and greyish pruinose; *exciple* blackish and usually grey pruinose, mostly obscuring the disc, sometimes gaping, in section *c.* 10 µm thick and red-brown in the uppermost part. *Hypothecium* 25–40 µm thick, pale brown. *Hymenium* 70–90 µm thick, mostly hyaline, red-brown and intensifying in K in the uppermost *c.* 10–15 µm, sometimes overlain by a crystalline pruina; *asci* narrowly clavate, 60–80 x 12–18 µm. *Ascospores* transversely 7(–8)-septate, (18–)20–*24.3*–28.5(–30) x 4–*4.6*–5 µm. *Conidia* filiform, curved, 10–20 x 0.5 µm. Chemical composition: dehydroconstipatic acid; thallus K–, KC–, C–, P–, UV–. Figure 3.

Remarks: This species is here recorded for Tasmania for the first time, based on a single, large collection from a sheltered overhang on a large outcrop of calcarenite along the sea-shore on Flinders Island. There

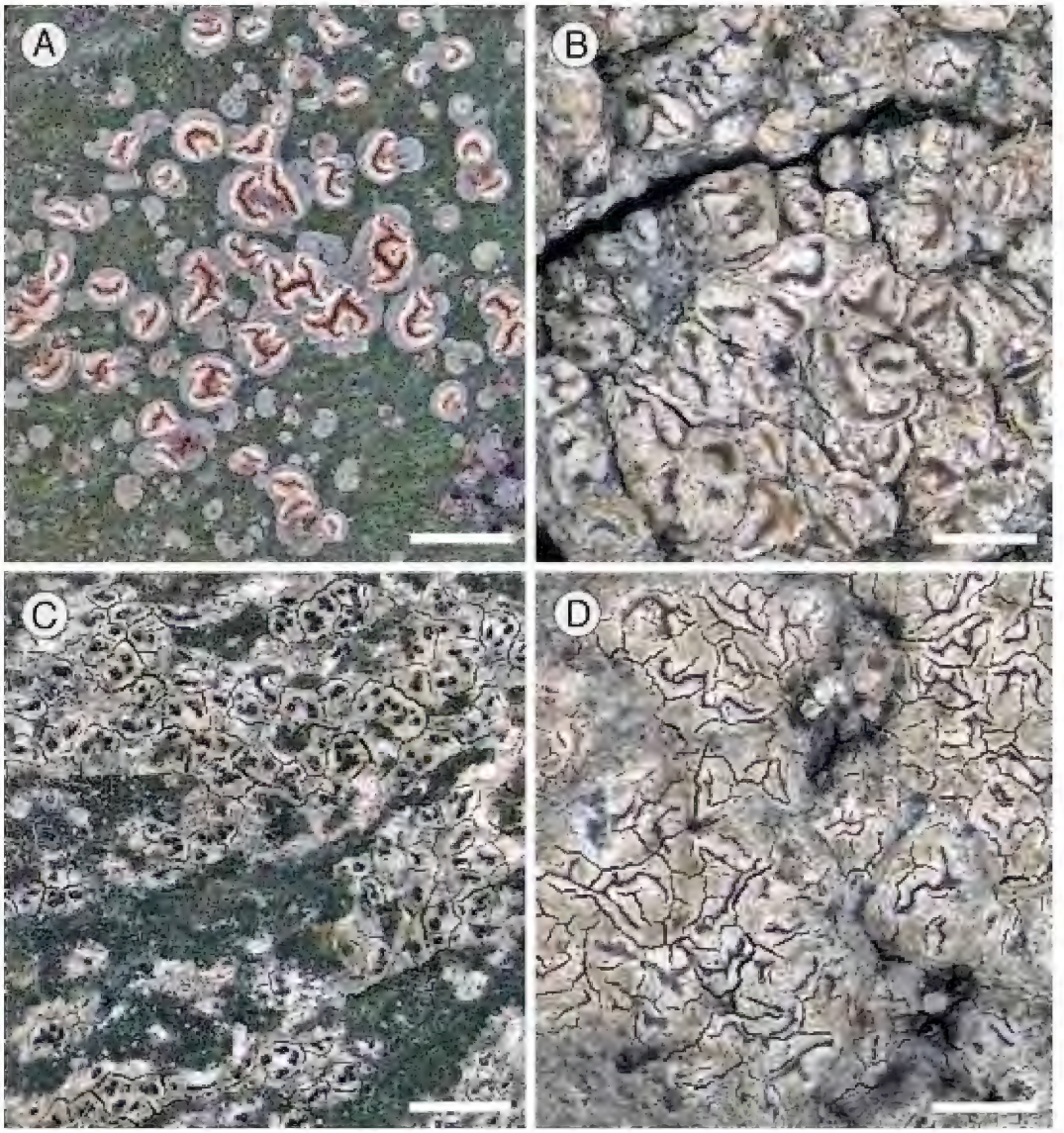

Figure 2. Habit of Tasmanian *Enterographa* species. **A.** *E. bella.* **B.** *E. divergens*. **C.** *E. ophiolithica*. **D.** *E. subgelatinosa*. Scale = 1 mm.

it was closely associated with *Angiactis banksiae* (Müll. Arg.) Kantvilas & Stajsic, a similarly uncommon, highly restricted species of the Roccellaceae. The thick, white, chalky thallus, marked with the black clusters of linear lirellae make *E. cretacea* very distinctive, and it has no known confusing species. Several species of *Opegrapha* occur in similar habitats but these tend to have a thin, crustose or evanescent thallus and lirellae with a heavily carbonised exciple. The original description of this species (from a specimen from NSW) (McCarthy & Elix 2016) appears to be based on a poorly developed, possibly immature thallus.

Specimen examined: **TASMANIA:** Flinders Island, Cave Beach, 41°01'S 147°53'E, 5 m, 2006, *G. Kantvilas* 82/06 (HO).

Enterographa divergens (Müll.Arg.) Redinger

Reprium Nov. Spec. Regni Veg. 43: 62 (1938); – *Chiodecton divergens* Müll.Arg., *Bull. Herb. Boissier* 1: 62 (1893). Type: Australia, Victoria: Cheltenham, on *Banksia serrata*, 1890, *F.R.M. Wilson* 870 (holotype – G, isotype – MEL 0026211A!).

Thallus pale cream to pale pinkish beige-grey, rather scurfy, verruculose and often as much as 0.7 mm thick, forming extensive, undelimited patches; *medulla* inspersed with angular crystals *c.* 12–25 µm wide, KI+ violet-blue. *Photobiont* trentepohlioid. *Apothecia* lirelliform, 0.2–1 mm long, simple, branched or stellate, curved or straight, immersed in verrucae *c.* 1–1.5 mm wide that dominate the thallus; *disc* brown, slit-like or, rarely, ellipsoid; *exciple* pale to dark red-brown, mostly obscuring the disc. *Hypothecium* 25–70 µm thick, hyaline. *Hymenium* 80–110 µm thick, diffusely pale brown in the upper part; *asci* narrowly clavate, 70–95 x 14–17 µm. *Ascospores* transversely 7–8(–9)-septate, (22–)23–*28.0*–33(–35) x (3.5–)4–*4.7*–5.5 µm. *Conidia* filiform, curved, 10–20 x 0.8–1 µm. Chemical composition: nil. Figures 1A–B, 2B.

Remarks: Previously unrecorded for Tasmania, this species is widely distributed but highly localised around the Tasmanian coast. It occurs on the twigs and small branches of shrubs and small trees, sometimes covering these entirely to give them a lumpy appearance. It is sometimes associated with another member of the Roccellaceae, *Schismatomma occultum* (C.Knight & Mitten) Zahlbr., which has a thallus of a similar pinkish hue, elongate apothecial discs that are sometimes elongate and lirelliform, but differs, *inter alia*, in having a thalline apothecial margin and 3-septate ascospores.

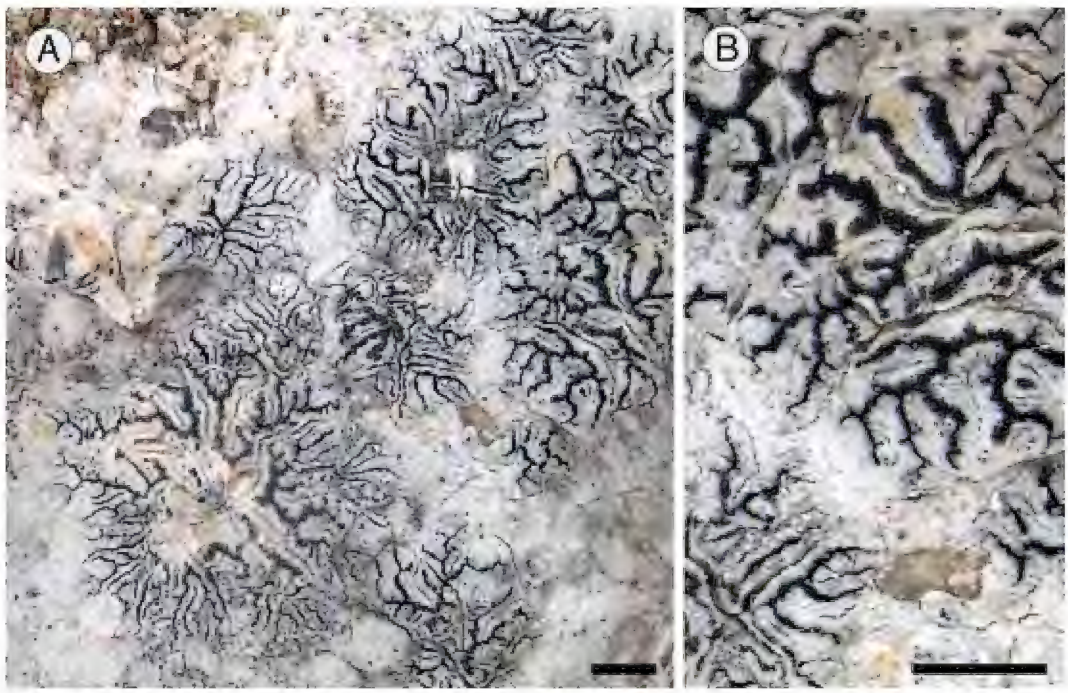

Figure 3. *Enterographa cretacea*. Scale = 1 mm.

Enterographa divergens is known from mainland Australia, especially the coasts of Victoria and South Australia (Kantvilas 2019) as well as from South-East Asia and East Africa (Sparrius 2004).

Sparrius (2004) incorrectly cited a specimen in BM as the holotype, but although this specimen was collected from the same substratum and locality as the type, it cannot be regarded as type material as it was collected in 1893, three years after original publication. On the other hand, a specimen in MEL (26211), dated 'April 1890' is still likely to be correctly cited as an isotype, especially as there are numerous such examples of duplicates in MEL of specimens that Wilson sent to Jean Müller in Geneva.

Specimens examined: **TASMANIA:** Bruny Island, The Neck, 43°16'S 147°21'E, 30 m, 2005, *G. Kantvilas* 152/05 (HO); Flinders Island, Wybalena, 40°01'S 147°53'E, 10 m, 2006, *G. Kantvilas 75/06* (HO); Slaves Bay, 40°55'S 144°39'E, 15 m, 2003, *G. Kantvilas* 543/03 (HO); *ibid.,* 10 m, 2014, *G. Kantvilas 407/14* (HO); Spring Bay Mill, Lispers Corner, 42°32'S 147°56'E, 10 m, 2021, *G. Kantvilas* 15/21 (HO).

Enterographa ophiolithica **Kantvilas, sp. nov.**

Mycobank No.: MB841137

Recognised by the whitish thallus lacking lichen compounds, the short, often punctate, black apothecia, 0.15–0.4 mm long, and the (3–)5–7(–8)-septate ascospores, 20–30 µm long and 4–6 µm wide.

Type: Tasmania: Trial Harbour, 41°56'S 145°10'E, on coastal serpentinite boulders and outcrops, 2 m elevation, 10 September 2014, *G. Kantvilas 420/14* (holo – HO).

Thallus whitish, ± smooth, rimose, to *c.* 200 µm thick, forming irregular, undelimited, discontinuous patches closely following the cracks and contours of the substratum; *medulla* densely inspersed with angular crystals to 30(–100) µm wide, patchily KI+ blue. *Photobiont* trentepohlioid. *Apothecia* scattered, at first punctiform and 0.08–0.12 mm wide, becoming elongate-lirelliform and 0.15–0.4 mm long, abundant, immersed in the thallus; *disc* dark brown to black, rather fleck-like; *exciple* concolorous with and mostly ± obscuring the disc, in section red-brown and 10–50 µm thick in the uppermost part. *Hypothecium* 30–50 µm thick, hyaline. *Hymenium* 80–110 µm thick, diffusely pale brown in the upper part; *asci* narrowly clavate, 65–90 x 12–16 µm. *Ascospores* transversely (3–)5–7(–8)-septate, (20–)22–25.6–30 x 4–4.6–5(–6) µm. *Pycnidia* black, very abundant, resembling incipient apothecia; *wall* red-brown in the upper part; *conidia* filiform, curved, 10–25 x 0.5 µm. Chemistry: nil; all spot tests negative. Figures 1C–D, 2C.

Etymology: The specific epithet refers to the substratum of the new species (Latin for "growing on serpentine rock").

Remarks: Saxicolous species of *Enterographa* are relatively few and, in that respect, *E. ophiolithica* is more easily distinguished by a dearth of particular features rather than by any single unusual one. In the Australian flora, there are only two saxicolous taxa, both differing from the new species by their thallus morphology and chemistry: *E. cretacea* has a chalky white thallus containing dehydroconstipatic acid; *E. subgelatinosa* has a greenish grey thallus containing gyrophoric and psoromic acids. Both of these species also tend to occur in sheltered underhangs, whereas *E. ophiolithica* occurs on the upper, exposed surface of rocks. Further afield, other saxicolous species of the genus can be similarly distinguished. The pan-tropical *E. leucolyta* (Nyl.) Redinger has a thick, verruculose green-grey thallus containing gyrophoric acid, whereas the temperate Northern Hemisphere taxa, *E. hutchinsiae* (Leight.) A.Massal., *E. crassa* (DC.) Fée and *E. pitardii* (B. de Lesd.) Redinger, all contain confluentic acid.

The new species is known from a single collection from a seashore serpentinite boulder on Tasmania's west coast and is readily observed by its whitish thallus and the short, often punctate, black apothecia. The black pycnidia can be very similar to the apothecia and it may require thin sectioning and high-power examination to tell these structures apart. This species is part of a relatively rich saxicolous association of lichens that includes *Amandinea otagoensis* (Zahlbr.) Blaha & H.Mayrhofer, *A. variabilis* Elix *et al.*, *Bacidia littoralis* Kantvilas, *Buellia halonia* (Ach.) Tuck., *Parmotrema neopustulatum* Kurok., *Lepra erubescens* (Hook.f. & Taylor) A.W.Archer & Elix, *Monerolechia badia* (Fr.) Kalb, *Opegrapha* cf. *spodopolia* Nyl., *Rhizocarpon intersitum* Arnold and *Thelenella tasmanica* H.Mayrhofer & P.M.McCarthy.

Serpentinite is known the world over for supporting unusual vascular plants (van der Ent *et al.* 2015) including Tasmania (e.g. de Salas 2018), although there is far less

documented about its lichens (see Sigal 1989, Sirois *et al.* 1988). In Tasmania, many serpentinite areas have been heavily burnt, leading to a loss of much of their lichen flora and a shift towards ubiquitous taxa. Alternatively, the serpentinite is overlain by acidic peats which negate any chemical influence of the underlying rock. Kantvilas (1991) postulated that the distribution of *Cladonia praetermissa* var. *modesta* (Ahti & Krog) Kantvilas & A.W.Archer in Tasmania may be linked to serpentinite-derived soil but this ecological pattern has become less distinct as additional collections and observations have been made. In that respect, *E. ophiolithica* represents the first example of a Tasmanian lichen that is entirely linked to serpentinite.

***Enterographa subgelatinosa* (Stirt.) Redinger**

Reprium Nov. Spec. Regni Veg. 43: 66 (1938); – *Platygrapha subgelatinosa* Stirt., *Proc. Phil. Soc. Glasgow* 10: 301 (1877). Type: New Zealand: near Wellington, 1874, *J. Buchanan* (lectotype, *fide* Galloway 1985 – GLAM; isolectotype – BM!).

Thallus pale greenish grey, smooth, rimose, reflecting the contours of the substratum, to 150–250 µm thick, forming irregular, rather discontinuous patches to 120 mm wide, sometimes delimited by a thin, dark prothallus; *medulla* inspersed with angular crystals 8–30 µm wide, patchily KI+ blue. *Photobiont* trentepohlioid; *Apothecia* lirelliform, abundant, 0.1–1 mm long, simple or occasionally branched, curved or straight, immersed in the thallus; *disc* reddish brown to dark brown, slit-like or exposed; *exciple* concolorous with the disc, obscuring the disc or gaping. *Hypothecium* 20–40 µm thick, hyaline to pale yellow-brown. *Hymenium* 70–90 µm thick, diffusely pale brown in the upper part; *asci* narrowly clavate, 60–75 x 13–16 µm. *Ascospores* transversely (3–)6–7-septate, (18–)20–*24.0*–28(–30) x 3.5–*4.4*–5 µm. *Conidia* filiform, curved, 10–20 x 0.5–0.8 µm. Chemical composition: gyrophoric acid, psoromic acid (±); thallus C+ red, P+ yellow or P–; the concentration of these compounds can be very low and hence spot tests may be unreliable. Figure 2D.

Remarks: Previously reported from mainland Australia and New Zealand (Sparrius 2004), this species is here recorded from Tasmania for the first time. It is uncommon (or overlooked) on coastal rocks in the west and south, typically growing in sheltered underhangs of large boulders or on the undersides of shoreline cobblestones. It is frequently associated with species of *Opegrapha*, which are distinguished readily by their black, carbonised lirellae.

Specimens examined: **TASMANIA:** Fishers Point, 43°34′S 146°55′E, sea-level, 2004, *G. Kantvilas* 75/04 (HO); Granville Harbour, 41°48′S 145°02′E, 3 m, 2013, *G. Kantvilas* 115/13 (HO); mouth of Interview River, 41°35′S 144°53′E, 3 m, 2015, *G. Kantvilas* 143/15 (HO).

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ROYAL BOTANIC GARDENS VICTORIA

Lobelia pachytricha (Campanulaceae; Lobelioideae), a new species from South Australia and Victoria

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Introduction

Lobelia pedunculata R.Br. is a widespread member of the 'creeping' lobelias, most of which were previously treated in Australia as *Pratia* (e.g. Toelken 1986, Ross 1996). As currently understood, it occurs from north-eastern New South Wales to south-eastern South Australia and is widespread in Tasmania. It occurs from near sea level to alpine areas of 1800 m elevation or more. Across its range there is considerable morphological variation, and some forms have been selected as ground-covers for the horticultural industry. Its cultivated range beyond Australia includes New Zealand, where it has become naturalised (Ogle *et al.* 2020), parts of Europe, North America and southern Africa. The morphological variation is complicated by dioecy within the species, with male plants generally having larger and sometimes more colourful flowers. A distinctive entity, usually included within the variation of *L. pedunculata,* occurs in the south-western part of the species' distribution and is characterised by generally brighter blue, and more strongly zygomorphic, fan-shaped corollas. It is further distinguished by the presence of short, thick hairs on the dorsal part of the anther tube. Although sometimes treated as distinct (e.g. Toelken 1986, Ross 1996), it has never been provided with a valid name, and is here formally recognised as a new species.

Abstract

Lobelia pachytricha is described and illustrated, and major differences between it and closely related species discussed. Typification of *Lobelia pedunculata* is discussed.

Keywords: Campanulaceae, Lobelioideae, Almanda Blue, wetlands, taxonomy

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Methods

The descriptions presented herein are based on both fresh material and herbarium specimens. Hypanthium features were assessed at flowering stage. Corolla tube length was measured from the corolla base (where it becomes distinct from the hypanthium) to the sinuses between the three lobes of the lower lip, and thus includes the proximal part of the lower lip where the three lobes are fused. The length of the upper two corolla lobes was measured as the distance between the tip of the lobe and sinus between the upper (2-lobed) and lower (3-lobed) lips. The length of the lateral lobes of the lower lip was measured from the tip of the lobe to the sinus between the lateral and central lobes of the lower lip. The length of staminal filaments was measured from their junction with the hypanthium to the base of the anther tube.

Taxonomy

***Lobelia pachytricha* Albr. & N.G.Walsh sp. nov.**

Pratia pedunculata sens. H.R.Toelken in J.P. Jessop & H.R. Toelken (eds), *Fl. South Australia* 3:1374 (1986), non R.Br.

Pratia sp. aff. *pedunculata* (South-west Victoria), J.H. Ross, Census Pl. Victoria edn 5: 58, 202 (1996)

Lobelia sp. South-western Victoria (A.C.Beauglehole 30495) [Census of South Australian Plants Algae and Fungi http://flora.sa.gov.au/census.shtml accessed Aug. 6 2021]

***Type*: AUSTRALIA.** Victoria, Cordover (Red-gum) Swamp, Lower Glenelg National Park. 4 km south east of Drik Drik, 11.xii.2021, *D.S. Pitts DSP202101* (holo MEL 2518115; iso: AD, CANB)

Dioecious, mat-forming perennial *herb*. *Stems* prostrate to decumbent, glabrous, rooting at nodes, weakly ridged from decurrent leaf bases shortly below nodes. *Leaves* more or less distichous, alternate; lamina ovate, broadly elliptic, orbicular or rarely obovate, 2–13 mm long 1.5–10 mm wide, glabrous or rarely with occasional hairs to *ca*. 0.1 mm long; margins with 1–5 teeth on either side, each tooth with a minute translucent region at apex; apex obtuse to acute, base contracting gradually or abruptly to a petiole to 2.5 mm long, or petiole virtually absent. *Flowers* axillary, solitary, borne at irregular intervals along stem. Male and female flowers superficially similar but females usually slightly smaller. *Pedicels* 3–100 mm long, glabrous, often recurved in fruit, a pair of rudimentary bracteoles to *ca*. 0.2 mm long sometimes present at base of pedicel. *Hypanthium* obconic to ellipsoid in female flowers (2.4–3.5 mm long, 1–2 mm diam.), obconical in male flowers (1–2 mm long, 1–1.5 mm diam.), glabrous, rarely scabridulous. *Calyx* lobes erect or spreading, triangular, 0.8–3 mm long, entire or with a rudimentary tooth on each side toward the base, glabrous. *Corolla* fan-shaped, 4–9 mm long (females 4–7.5 mm; males 5–9 mm), glabrous externally; lobes spreading or the tips slightly reflexed, elliptic to oblanceolate-obovate, overall blue to blue-mauve (sometimes very pale) on both surfaces, usually with a darker midvein, those of female flowers 2.0–4.5 mm long, upper lobes 1–2 mm wide, lower lobes 1–2.5 mm wide; those of male flowers 3–6 mm long, upper lobes 1–2.2 mm wide, lower lobes 1.3–2.8 mm wide, width subequal or the upper 2 lobes to *ca*. 2/3 width of lower lobes; sinus between upper and lower lobes often deeper than between each of the 3 lower lobes; lobe apices acute to abruptly tapered and very shortly acuminate or cuspidate; lower 3 lobes becoming paler or whitish toward base, with 2 yellowish-green bands (sometimes partially connected) at base, extending into throat of tube; tube 2–4 mm long, split dorsally to 0.1–0.7 mm from base, white to light green externally with two longitudinal channels extending from the sinuses between the lower 3 lobes towards the hypanthium, with fine retrorse hairs (rarely glabrous) internally towards base. *Filaments* 1.7–2.7 mm long, glabrous or puberulous, adnate to the corolla tube near its junction with the hypanthium for up to 0.8 mm, distally connate for 0.2–1 mm below the anther tube, rarely quite free to base of anther tube, very gradually widening towards connate part, white to green or tinged blue. *Anther tube* white and sterile in female flowers, dark or denim-blue in male flowers, 0.7–1.1 mm long (females), 1–1.3 mm long (males), with thick, sub-acute to obtuse hairs *ca*. 0.1 mm long in rows dorsally (less conspicuous or sometimes absent in female flowers), the apex of the 2 lower anthers each with a seta 0.3–0.5 mm long and a cluster of short hairs 0.05–0.1 mm long; upper 3 anthers glabrous at apex. *Stigma* protruding from apex of the anther tube in female flowers, 2-lobed, densely papillose, surrounded by a ring of hairs. Style glabrous. *Disc* surrounding ovary

summit yellowish-green, puberulous. *Fruit* (from few examples available) ellipsoid to obovoid, sometimes asymmetric, slightly compressed, 4–6 mm long, *ca.* 3 mm wide, glabrous, indehiscent. *Seeds* light brown, broadly ellipsoid, compressed, 0.5–0.6 mm long, 0.4–0.5 mm wide, testa surface with a network of microscopic ridges forming irregular but more or less isodiametric alveolae *ca.* 20–30 µm diam**.** Figures 1, 2a & b.

***Representative specimens:* (*ca.* 50 specimens examined) SOUTH AUSTRALIA**. South East, Glencoe District. Between Marshes Swamp and Mt Burr, *K. Alcock s.n.*, 2.ii.1992 (AD, MEL!); Clarendon, *Anon.* s.n., xii.1881 (AD!); 1 km SW of Lake Edward, *R.J. Bates 9855*, i.1987 (AD); Scott Creek Conservation Park. 100 m down from Almanda Mine, *R.J. Bates 21921*, 5.i.1990 (AD!); 5 km S of Mylor, *R.J. Bates 43252*, 4.v.1996 (AD!); Behind Woods & Forests Headquarters, Compton, *B. Copley 3389*, 18.i.1971 (AD); Mt Bold Reservoir adjacent Onkaparinga River *ca.* 800 m upstream from [Moullgraves] Crossing, *D.J. Duval 1504 & T.S. Te*, 24.ii.2009 (AD); East of Penola, *D. Hunt 363*, 12.xi.1964 (AD); Naracoorte Caves, *D. Hunt 2258*, 29.xi.1964 (AD!); 4 km [2.5 ml] SW of Glencoe, *D.N. Kraehenbuehl 1*, 1.vii.1965 (MEL!); Telford Scrub Con[servation] P[ar]k, *ca.* 15 km N of Mt Gambier, *D.N. Kraehenbuehl 5353*, 28.xi.1990 (AD!); Section 142 (Lot 5), Hundred of Encounter Bay. 'Mt Alma' Swamp, *P.J. Lang, D8575*, 6.xii.1988 (AD!); Onkaparinga River, *F. Mueller s.n.*, 1851 (MEL!); Near Miss Ashby's Flora Res[erve] [Nangawooka], *D.E. Murfet 641*, 10.i.1988 (AD!); Mt McIntyre Swamp, Mt Burr Forest Reserve, *D.E. Murfet 2679, K.M. Alcock, R.L. Taplin*, 20.iii.1997 (AD); The Marshes Native Forest Reserve, *D.E. Murfet 4275*, 24.xii.2002 (AD); Onkaparinga, *J.G.O. Tepper 374*, xii.1881 (MEL!); 1.5 miles [2.4 km] N of Wandilo Railway Station, *I.B. Wilson 634*, 5.xi.1966 (AD); 3 km SSW of Tarpeena, *P.G. Wilson 1245*, 15.xi.1959; N part of Honans Scrub Reserve, *A.A. Munir 5386*, 2.xi.1981 (AD). **VICTORIA.** Mill Swamp, *ca.* 2 km N of Wilkin, *D.E. Albrecht 5168*, 3.xii.1992 (MEL!); Lower Glenelg River area, Red Gum Swamp, S of Greenwald, *A.C. Beauglehole 6521*, 17.i.1965 (MEL!); Gorae West, *ca.* 16 km [10 ml] NW of Portland, *A.C. Beauglehole 6530*, 21.i.1965 (MEL!); Grampians. Wannon River. East of Mirranatwa Gap, *A.C. Beauglehole 16361*, 9.xii.1967 (MEL!); Lower Glenelg River, W side of river. Keegans Bend, *A.C. Beauglehole 19089*, 24.i.1965 (MEL!); Grampians, Fyans Creek, *A.C. Beauglehole 24947*, 8.iii.1968 (MEL!); Grampians, E of Mt Zero, Goltons Ck, *A.C. Beauglehole 30092*, 18.xii.1968 (MEL!); Between Red Hill Road and Victoria Valley Road, Victoria Range, Grampians, *A.C. Beauglehole 30249*, 2.i.1969 (CANB!, MEL!); Grampians, Henham Tk, 5 km [3.1 ml] SE of Junction with Victoria Valley Rd, *A.C. Beauglehole 30392,* 29.i.1969 (CANB!); Grampians. South end of Serra Range, Wannon River Bridge, North of Dunkeld, *A.C. Beauglehole 30495*, 11.ii.1969 (MEL!); Glenelg Shire, 8.8 km [5.5 ml] N of Dartmoor, *A.C. Beauglehole 38121*, 31.xii.1971 (MEL!); 6 km north of Portland, *A.C. Beauglehole 93524*, 19.v.1991 (MEL!); 6 km N of Portland, Bolwarra Bushland Reserve, *A.C. Beauglehole 93527*, 11.viii.1991 (MEL!); Warrawong Farm, between Hamilton and Branxholme, *M.G. Corrick s.n.,* 6.xi.1966 (MEL!); Grampians. Lake Wartook, S end, *M.G.Corrick 757*, 6.iv.1968 (MEL!); 21 km NE of Portland, lower Fitzroy River, 0.8 km S of 'Avonlea', *M.D. Crisp 6874*, 17.xi.1980 (CANB!); Otway Region, Chapple Vale, *G.E. Earl 22*, 13.iii.1984 (MEL!); Lower Glenelg River, *J.P. Eckert 52,* 1891 (MEL!); Grampians, 6.4 km [4 ml] north of Zumsteins, *S.T.W. Parfett 3*, 3.v.1982 (MEL!); Banks of Wimmera River, *F.M.Reader s.n.*, 26.xii.1897 (MEL!); Lower Plenty. Yarra Valley Parklands. Yaruk Tamboore Wetlands, *V. Stajsic 7274, S. Hodge, S. Liu*, 17.xii.2014 (MEL!); Cassidy Gap, Serra Range, *H. Streimann 2733*, 12.xii.1975 (CANB!); Mt William, *D. Sullivan 13*, xii.1880 (MEL!); Hall's Gap, Grampians Mts, *J.E. Tilden 825, s.d.* (MEL!); Near Cape Otway, *C. Walter s.n.*, iii.1874 (MEL!); Hawkesdale near Hopkins River, *H.B. Williamson 22,* 1893 (MEL!); Curdies River, *H.B. Williamson 34*, 1894 (MEL!); Lower Glenelg River, near Eaglehawk Bend, *J.H. Willis s.n.*, 31.x.1948 (MEL!).

Illustrations: H. R. Toelken in J.P. Jessop & H.R. Toelken (eds), *Fl. South Australia* 3:1375 (1986) as *Pratia pedunculata*; N. Romanowski, *Australian Plants* 17(136), p. 164 (1993), as *Isotoma fluviatilis*; D.E. Albrecht in N.G. Walsh & T.J. Entwisle (eds), *Fl. Victoria,* 4:569 (1999) as *L. pedunculata* 'south-western Victorian variant' (anther tube only); Mayfield, E. (2013). *Flora of the Otway Plain and Ranges. 2*, p. 133 (2013) as *L. pedunculata*.

Distribution: Occurs from SE South Australia near Scott Creek, *ca.* 20 km SW of Adelaide, to SW Victoria (including the Grampians where rather common), as far east as Chapple Vale in the Otway Ranges. Figure 3.

Figure 1. *Lobelia pachytricha*. **a:** female flowers (from near Drumborg, Victoria) https://www.inaturalist.org/observations/38650001; **b:** male flowers and **c:** closeup showing corolla coloration and short thick hairs on the dorsal surface of male anther tube (from near Mooralla, Victoria) https://www.inaturalist.org/observations/28831419 ; **d:** male plant (from near Hotspur, Victoria) https://www.inaturalist.org/observations/20976451. (All images: Reiner Richter)

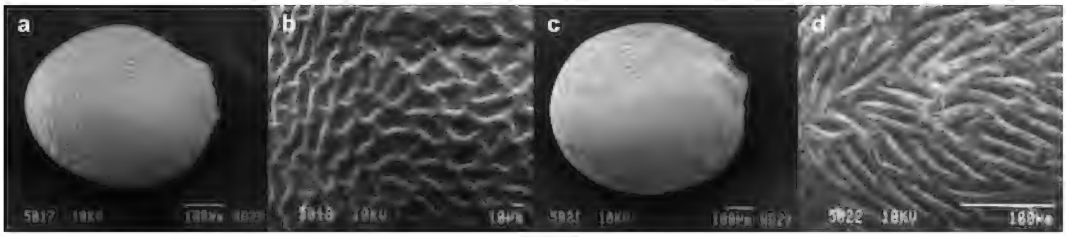

Figure 2. Seeds and seed surface ornamentation. **a & b:** *Lobelia pachytricha* (from same location as *A.C. Beauglehole 93524*); **c & d:** *Lobelia pedunculata* (from *L. Rodway 235*).

Habitat: *Lobelia pachytricha* typically occurs along margins of watercourses, in peaty swamps and low-lying woodlands with commonly associated species including *Eucalyptus ovata, E. camaldulensis, Callistemon sieberi, Leptospermum lanigerum, Melaleuca squarrosa, Gahnia* spp. and other semi-aquatic herbs (e.g. *Juncus* spp., *Carex fascicularis, Centella cordifolius, Goodenia* spp., *Hydrocotyle* spp., *Mazus pumilio, Montia australasica, Myriophyllum spp., Ranunculus spp.)*. Occasionally in drier woodlands of e.g. *Eucalyptus leucoxylon, E. obliqua*, but in areas with impeded drainage.

Conservation Status: *Lobelia pachytricha* does not appear to qualify as threatened (VU, E, CR) applying IUCN (2012) criteria, but can be reasonably considered rare. It is protected in several large conservation reserves in both South Australia and Victoria. However, effects of climate change could result in drying of swamps and small streams, conceivably rendering the species as threatened in the foreseeable future (if not within the next decade). Many of the areas represented by older South Australian records are now forestry or pasture. Many of the Scott Creek CP populations were burnt in recent severe fires (J. Conran, Univ. of Adelaide, pers. comm. 2022), so its security there is dependent on its ability to regenerate post-fire. It is likely threatened (*sensu* IUCN 2012) in South Australia.

Notes: Vegetatively, *Lobelia pachytricha* is very similar to *L. pedunculata*, but is more commonly glabrous, whereas leaves and stems of *L. pedunculata* are usually somewhat to distinctly hispid and uncommonly glabrous. The leaf blades of *L. pachytricha* are mostly gradually tapered towards the base and only sometimes

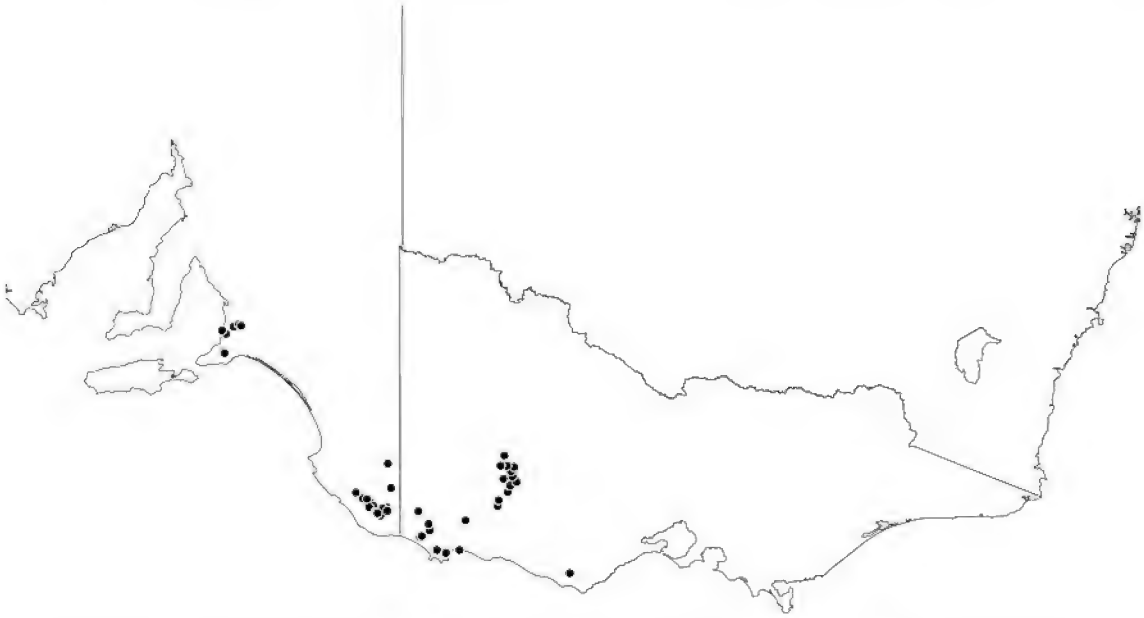

Figure 3. Distribution of *Lobelia pachytricha* based on herbarium collections at AD, CANB and MEL (excluding collections considered to be non-indigenous occurrences).

abruptly tapered, while in *L. pedunculata* the leaf blades are more consistently abruptly tapered (i.e., very obtuse to truncate or shallowly cordate). The corollas of *L. pachytricha* differ considerably from those of *L. pedunculata* in being almost fan-shaped with the two dorsal lobes subequal to, or distinctly narrower than, the lower three. In *L. pedunculata* the corolla lobes are similar in width and more evenly radially oriented. Male flowers of *L. pachytricha* are distinctive in the dorsal side of the anther tube having rows of moderately dense, sub-acute to obtuse hairs *c.* 0.1 mm long. These hairs are less conspicuous or occasionally absent in female flowers. In *L. pedunculata*, the anther tube is glabrous dorsally, or if hairs are present (observed only in very few specimens from Tasmania) they are sparse, narrow and acute. Based on SEM images of a few representatives of either species, there is an apparent difference in seed surface patterning between them. In *L. pachytricha* the alveolae formed by the network of surface ridges are almost isodiametric, not elongated and narrow as in *L. pedunculata* (Figure 2). Despite considerable variation in the corolla coloration in *L. pedunculata*, none of the variants quite match *L. pachytricha*. In *L. pachytricha* the corolla lobes are largely pale to rich blue or blue-mauve and usually have a darker midvein at least in part. The three lower lobes have a distinctly paler (or white) zone toward the base above the yellow-green zone, the latter made up of two bands, sometimes partially connected, running into the corolla tube. In *L. pedunculata* the corolla lobes are either wholly white or pale blue to mauve and either lack a darker midvein, or if present, it is usually accompanied by dark short lateral veins. When the corolla lobes are pale blue to mauve, a distinctly paler (or white) zone may be present toward the base of the lower three lobes, but it is very narrow. The yellow-green zone on the ventral side of the throat appears as a more solid block of pigment than in *L. pachytricha*.

Bentham (1868) may have been the first to have recognised the species described herein, referring it to a 'small form' of *Lobelia purpurascens* R.Br., a species of east-coast Australia. He most likely associated it with *L. purpurascens* on the basis of its distinctly zygomorphic flowers with the upper two corolla lobes distinctly narrower than the lower three. Wimmer (1953, p. 110), under *Pratia pedunculata*, cited a specimen from Halls Gap, Grampians Mtns Victoria (*J.T. Tilden n. 825*), with the note '*specimen fem. glabrum*' [specimen female, glabrous] – presumably emphasising the aberrant glabrous state with respect to typical *Lobelia (Pratia) pedunculata*. This specimen is at MEL (no 1592628). It is *L. pachytricha*. Wimmer has annotated the specimen 'var. tildenae', but the name was never formalised. He annotated the label '*foli basi plerumque angustata*' (leaves at the base mostly narrowed) indicating that he had noted the tendency for the leaf bases to be tapered in contrast to the ±truncate leaf-bases of *L. pedunculata* as noted above. Toelken (1986) recognised two species in the *L. pedunculata* group, but erroneously treated the 'fan-flowered' entity (i.e., *L. pachytricha*) as *Pratia pedunculata* and the 'typical' form of *Lobelia pedunculata* as *P. puberula*. The correct application of the name *P. puberula* has caused confusion as the three collections cited by Bentham in the protologue comprise three elements: a high-elevation form of *L. pedunculata, L. leucotos* Albr. and *L. purpurascens*. Albrecht (2000) lectotypified *P. puberula* on the high-elevation form of *P. pedunculata* from the Cobberas Mountains, Victoria which differs somewhat from lowland forms in having corolla lobes commonly white with purplish venation.

Lobelia pachytricha is sometimes cultivated as a garden ornamental. A selection 'Almanda Blue' from a population in Scott Creek Conservation Park south-east of Adelaide has been registered under Australian Plant Breeders Rights and a US patent has been applied for it (United States Patent Application 20180084703) (FPO 2018). The Scott Creek population (*c.* 20 km SSE of Adelaide) and several nearby are remote from other known populations – the nearest being in the far south-east of South Australia, some 400 km away. Two 19th century collections from 'Onkaparinga' near Scott Creek (*Mueller*, 1851 (MEL 1596757), *Tepper*, 1881, (MEL 15981290)) appear to dispel any notion that the species may have been introduced there. Scott Creek is a tributary of the Onkaparinga River from the margins of which Mueller's collection was made. A recent collection from the Yarra Valley, *ca.* 15 km NE from Melbourne CBD (*Stajsic 7274 et al.* (MEL 2384747, 2384782)), is likely to represent an introduction rather than a natural occurrence, there being no collections of this distinctive and attractive species prior to 2014 and the collection site being one at which there has been considerable rehabilitation work. Plants of *L. pachytricha* are

propagated and currently offered for sale in at least one 'native' plant nursery (La Trobe University Indigenous Nursery) and either through direct 'revegetation' planting or spread by seed or plant fragments by e.g. waterbirds, further occurrences in the lower Yarra Valley could be anticipated.

Herbarium specimens bearing our early determinations using the manuscript names *Lobelia* (or *Pratia*) *pedunculata* subsp. *pachytricha* Albr. can be taken to be *L. pachytricha.* Despite its obvious similarity to *L. pedunculata*, we have now chosen to recognise *L. pachytricha* at species rank, based on the weight of its combined morphological distinctions, and also the partly sympatric distribution with no evidence of morphologically intermediate plants that might otherwise suggest clinal variation or hybridisation between the two entities.

Lobelia pedunculata, even with the excision of *L. pachytricha*, remains a variable taxon, and continuing studies may support the recognition of further taxa, e.g. the high-elevation plants matching the lectotype of *Pratia puberula* as noted above.

Etymology: The epithet, from the Greek *pachys* = thick + *thrix/trichos* = hair, refers to the short, thick hairs on the dorsal surface of the anther-tube.

Generic placement: Molecular analyses by Knox (unpubl. data; pers. comm.) and Kagame et al. (2021), and morphology-based reviews by others (e.g. Lammers 2011) show relationships between the genera in Campanulaceae subfamily Lobelioideae to be complex and do not support recognition of many genera as monophyletic. Lammers (2011) attempted to resolve this complexity by recognising a very large *Lobelia* with 18 sections. In this arrangement, *L. pachytricha* and *L. pedunculata* belong to sect. *Hypsela,* which in Australia includes *Hypsela*, *Pratia*, *Isotoma* (but not its type species, *I. hypocrateriformis* (R.Br.) Druce) and some species traditionally placed in *Lobelia*, none of which resolve at the molecular level to monophyletic groups. Work is ongoing, but until a satisfactory arrangement is achieved, the least contentious position is to treat the new species, and its close relatives, in *Lobelia*.

Lectotypification of *Lobelia pedunculata*

Brown (1810) referred to the type of *L. pedunculata* as 'J (v.v.)', indicating that the plant was collected from between Port Jackson and Newcastle area, New South Wales, and seen live by him. Brown's herbarium at BM includes two specimens identified as types of *L. pedunculata*, both collected from 'Hunters River' on October 30 1801 and numbered *2620*. One sheet is fragmentary (BM000907575), the other (BM000907574) includes copious material in good flowering condition. Mabberley & Moore (2022) indicated that the fragmentary specimen derived from Dryander's herbarium was not available to Brown in preparing the *Prodromus*. Consequently, the specimen from Brown's own herbarium (BM000907574) should be treated as a holotype, and BM000907575 from Dryander's herbarium as the isotype. Walsh (*in sched* 3.xi.2008) had annotated BM000907574 and BM000907575 as lectotype and isolectotype respectively, but Mabberley's justification for holotype is reasonable and should be followed. The holotype is mounted on the same sheet as Tasmanian material of *L. pedunculata* collected by Ronald Gunn which is separately numbered BM000957992.

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ROYAL BOTANIC GARDENS VICTORIA

Lachnagrostis batesii in Europe as *Agrostis distans*, 160 years before being described for South Australia (Poaceae)

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Introduction

The South Australian endemic grass *Lachnagrostis batesii* A.J.Br. was described by Brown (2008). The earliest known collection at the time of publication was that of Ferdinand von Mueller in 1848 from the Gawler River. It took another 80 years until further, though still few, collections were made: J.B. Cleland in 1931 and 1940 from Hindmarsh Waterfalls and Dismal Creek, Victor Harbour; D.N. Kraehenbuehl in 1967 from the banks of the River Torrens, St Peters; L.A. Williams in 1972 from Hindmarsh Valley Falls; A.G. Spooner in 1980 from Torrens Gorge; R.J. Bates in 1984, 1988 and 1996 from Finniss River, Yundi, Gumeracha and Deep Creek, Cherryville, respectively (AVH 2020). In most cases, these collections were thought to be examples of small forms of *L. filiformis* (G.Forst.) Trin. (syn. *Agrostis avenacea* J.F.Gmel.). From 2000, through the survey efforts of R.J. (Bob) Bates, a further 40 or so collections of *L. batesii* have been made throughout the southern Mount Lofty Ranges (AVH 2020). During visits to W and P in 2018 and 2019 respectively, the author found a few mid-19th Century, non-databased sheets, labelled as *Agrostis distans* Kunze, which were instantly recognised to be specimens of *L. batesii*.

Materials and Methods

The origin of the W and P specimens of *Lachnagrostis batesii* and the name of *Agrostis distans* assigned by Kunze was investigated through

Abstract

Mid-19th Century collections of the endemic South Australian *Lachnagrostis batesii* A.J.Br. were found in Vienna (W), Paris (P) and Saint Petersburg (LE), labelled as '*Agrostis distans* Kze'. The species was described in the 1847 Leipzig *index seminum* and listed on several European indexes from 1851–1867. Although Kunze's description was brief and the type destroyed in WWII, his taxon is very likely the same as that later described as *L. batesii*. Consequently, the new combination *Lachnagrostis distans* (Kunze) A.J.Br. is made. It is proposed that *A. distans* raised in Europe was originally derived from seed separated from a collection made by Hans Behr in the 1844–1845 summer and described by Dietrich von Schlechtendal as *Deyeuxia aemula* Kunth.

Keywords: *Lachnagrostis distans*, Kunze, Schlechtendal, Behr, *index seminum*

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consultation of relevant historical documents and searches for further specimens at other European herbaria. Herbarium codes per Thiers (2022).

Results and Discussion

Examination and interpretation of the labels of the *Agrostis distans* sheets reveal that they derived from cultivation of Australian seed in various European botanical gardens from 1847 to 1869 (Table 1).

Annual *index seminum* (i.e. published index or catalogue to seed collections) have been produced by botanic gardens since the mid-16th Century, and continue to be a common output (Aplin et al. 2007). During the 19th Century, new plants and seed collected from the New World were highly sought after in Europe, and propagation of such was a major activity for many institutions. The *index seminum* served as an opportunity for horticulturists to exchange plant material and increase the range of species on display for their visitors. Previously unknown taxa were commonly described in these indexes and serve as

Table 1. Details associated with herbarium sheets of *Agrostis distans* Kunze, arranged chronologically.

Herbarium Sheet	Stamp and Label Details	Translation
P 02326274 HERB. MUS. PARIS.	Label 1: *agrostis distans* Kze Cult. de grainer le Dijon Grenier 1849 Label 2: *Deyeuxia scabra* Herbier donné par M. le Dr GRENIER , en 1875.	*Agrostis distans* Kunze Cultivated from seed from Dijon, France Jean Grenier collected 1849 *Deyeuxia scabra* Kunth syn. *Lachnagrostis rudis* (Roem. & Schult.) Trin. Herbarium donation ex Mr. le Dr Grenier in 1875
LE 01072060 HERBARIUM LE	*Agrostis distans* Kze 5527 hBerol culta 19 March 1852	*Agrostis distans* Kunze No. 5527 from the horticultural garden Berlin cultivated 19 March 1852
LE 01072059 HERBARIUM LE	3808 *Agrostis distans* Knze m. Rchbch a Al.Br.	No. 3808 *Agrostis distans* Kunze misit [sent] by Reichenbach and Alexander Braun
LE 01072061 Ex horto bot. Petropolitano	*Agrostis distans* Knze $^{28}/_{XI}$ 57 v. Herder	*Agrostis distans* Kunze 28 November 1857 vel vivas [collected live] Ferdinand von Herder
W not databased N°..... HRB. MUSEI. PALAT. VINDOB.	*Agroftiś diftanś* Kze. del. śem. Lipś 847 C.h.V. 859 Jul. e śem. h. Berol. 858. Patria: Auftralia	*Agrostis distans* Kunze in 'Selected Seeds' Leipzig, Germany 1847 Cultivated in the horticultural gardens Vienna in July 1859 ex seed sent from the horticultural garden Berlin in 1858 Country: Australia
LE 01072062 Ex horto bot. Petropolitano	Label 1: *Agrostis distans* Kunze 4798 Rchb 19 March 1852 !! etian Al. Braun fr misit 1852 Label 2: *Agrostis distans* Knze (4282 ex h. Carlsruh. s.n. *A. diffusae*) 18 $^{2}/_{VIII}$ 65 v. v. Herder	*Agrostis distans* Kunze No. 4798 Reichenbach, 19 March 1852 !! also Alexander Braun sent in 1852 *Agrostis distans* Kunze (No. 4282 from the horticultural gardens Karlsruhe, Germany, where named as *Agrostis diffusa* Banks & Sol. ex Hook.f.) plot/bed? 18, 2 August 1865 vel vivas [collected live] Ferdinand von Herder
W 1889-227546 HERB. MUS. PALAT. VINDOB.	collectio Reichenbach fil. Acqu. 1889 No. 227546 *Agrostis distans* Kze. Krakau 17 Aug 69	collection of Reichenbach's son Acquired in 1889, No. 227546 *Agrostis distans* Kunze Kraców, Poland, 17 August 1869

accepted publication of new names according to the *International Code of Nomenclature for algae, fungi and plants* (ICN 2018). This was the case for *Agrostis distans*, which was described in the 1847 *index seminum* (publ. 1848) by Gustave Kunze (1793–1851), Director of the University of Leipzig Botanical Gardens in Saxony of the German Confederation from 1837 until his death. Kunze noted that the specimen he described was grown from seed supplied by Eduard Richter (1795–1863), Head Gardener at the Luisium Castle Gardens near Dessau, Saxony (Richter 1847) but apart from having its origin in Australia, there is no indication as to who, when or how the seed passed to Richter. Although the species was listed in the *index seminum* for Leipzig (*Hortus Universitatis liter. Lipsiensis, seminum anno .... perceptorum offert delectum*) in 1847, 1848 and 1850, any specimens that may have been collected for the herbarium would have been unfortunately destroyed by bombing raids during WWII (Otto 2018).

With eastern Germany the focus of initial efforts to propagate garden specimens of '*Agrostis distans*', it is likely that a German botanist was responsible for sending the seed to Europe. The most obvious candidate is Ferdinand von Mueller (1825–1896) who initially arrived and worked in South Australia before moving to Melbourne as Victoria's Government Botanist (Orchard 1999). However, Mueller didn't arrive in Adelaide until 18th December 1847, when the Leipzig Gardens was already propagating the species. As noted above, Mueller did collect specimens of *Lachnagrostis batesii* on 15 April 1848. While still in Adelaide, Mueller (1849) compiled some notes for a planned (but never published) '*Second supplement to Brown's florae Novae Hollandiae et insulae Van Diemen*'. Among these notes is a line that reads "*Agrostis distans* Kunze N.H. [New Holland] W.A. [Walpers (1848–1849)] 1, 928 [Vol.1, p.928]". Despite having collected the species himself in the previous season, and being aware of Kunze's description, Mueller appears unaware of the original source of Kunze's material and determined his own collection as *A. aemula* R.Br.

A prime candidate for making the collection of *Lachnagrostis batesii* is Hans Hermann Behr (1818–1904), who spent a year in South Australia between September 1844 and October 1845, making extensive botanical and entomological collections (Kraehenbuehl 1981, Bretag 2016). On Behr's return to Germany, he entrusted much of his collection to his friend Dietrich Franz Leonhard von Schlechtendal (1794–1866), Professor of Botany at the Martin Luther University of Halle-Wittenberg, Saxony and Director of the Botanical Gardens, who determined and described 225 of his collections, including "11. *Neurachne alopecuroides* R.Br." (syn. *N. alopecuroidea* R.Br.), "12. *Deyeuxia billardieri* Kth." (syn. *L. billardierei* (R.Br.) Trin.), "13. *Deyeuxia aemula* Kth." (syn. *L. aemula* (R.Br.) Trin.) and "14. *Stipa elegantissima* Labill." (syn. *Austrostipa elegantissima* (Labill.) S.W.L.Jacobs & J.Everett) (Schlechtendal 1847). However, the description Schlechtendal provides for *D. aemula* differs from the description provided by Kunth (1833) and more closely conforms to *L. batesii* than to either *L. aemula* or *L. filiformis*. In comparison with *D. billardieri*, Schlechtendal describes *D. aemula* with "arista multo brevior (valvulum suam longitudine fere aequat), magis recta, supra medium dorsi exeunte" [i.e. the awn is much shorter (almost equal to the length of the lemma), straighter, inserted dorsally above the middle]. Kunth (1833) used Brown's (1810) description of *A. aemula* for his *D. aemula*, including: "arista dorsali, glumis duplo longiore" [i.e. awn dorsal, twice as long as the glumes]. Unlike Kunth (1833), Schlechtendal (1847) listed *Agrostis retrofracta* Willd., *D. retrofracta* Kunth. and *L. willdenowii* Trin. (all syn. *L. filiformis*) as well as *Agrostis aemula* R.Br. (syn. *L. aemula* (R.Br.) Trin.) ≡ "*Sieb. Agrostoth. n. 81*" (*L. filiformis*), as synonymous with *D. aemula* Kunth. This may explain his inclusion of Behr's collection into his broader concept of *D. aemula*. Brown (2006) described *L. batesii* with "awn reduced to a bristle inserted from about ¾ of the lemma length, 1.2–2.0 mm long, filamentous, straight or slightly curved" whereas Jacobs and Brown (2009) described *L. aemula* with "awn arising 25–60% lemma length from base, 5–10 mm long, with column twisted" and *L. filiformis* with "awn arising from near mid-point of lemma, 3.5–5.5 mm long, geniculate ...".

The collecting location of Behr's '*Deyeuxia aemula*' was the same as for his *D. billardieri*, being near water in a ravine in the Angas Park district of South Australia (Schlechtendal 1847). Angas Park is a region situated on the upper reaches of the North Para River and its tributaries, encompassing the towns of Nuriootpa, Angaston, Tanunda and Bethany. Recent collections of both *Lachnagrostis billardierei* and *L. batesii* have been

made from the same general region: *L. billardierei*: Upper Saunders Creek gorge – in wet places, 29.xii.1993, *R.Bates 35600*; *L. batesii*: Pewsey Vale Creek west of Kaiser Stuhl Conservation Park – in few damp spots, dry stony creek-bed, 29.i.2014, *R.Bates 90690*.

Many of Behr's 1844–1845 South Australian collection were inherited by HAL from Schlechtendal (Kraehenbuehl 1981) and now include 66 type sheets (JACQ 2021). However, a search of Halle's collections has failed to find Behr's '*Deyeuxia*' collections (Uwe Braun, pers. comm., 26 Feb. 2021), but sheets of both have been found at MEL. They are labelled "12. *Deyeuxia billardieri* Kth." (MEL 2124188A) and "13. *Deyeuxia aemula* Kth." (MEL 2124119A) in Schlechtendal's hand and both with "leg. Dr. Behr, mis. v. Schlechtendal" written by Otto Wilhelm Sonder (1812–1881) of Hamburg (Rita Macheda, pers. comm., 24 Mar. 2021). The first is confirmed as *Lachnagrostis billardierei* and the second as *L. batesii* (Fig. 1). Whether these sheets are duplicates of the specimens Schlechtendal described or the original collections, is unknown. Although they lack any inscription as to how they came to MEL, they appear to have been gifted to Sonder (1812–1881) and became part of the Victorian Government's purchase (on Mueller's recommendation) of the major portion of Sonder's herbarium in 1883. While some other MEL sheets from Behr's 1844–45 collections also lack an indication of having come from Sonder's herbarium (e.g. "11. *Neurachne alopecuroides* RBr." (MEL 1008969A), "90. *Opercularia scabrida* Schldl." (MEL 2267546A)), some sheets do note that they are ex Sonder (e.g. "15. *Juncus pallidus* RBr." (MEL 2189171A), "51. *Pimelea dichotoma* Schldl." (MEL 0051337A), "82. *Goodenia albiflora* Schldl." (MEL 0022291A)). Sonder's herbarium was and still is being incorporated into MEL but unfortunately, not all of the older integrated sheets were marked as ex Sonder (Pina Milne, pers. comm. 3 Mar. 2021).

Behr returned to South Australia in 1848–1849 and made further plant collections, of which some are thought to have been made with Mueller. The repository for the collections from this trip is uncertain, as Behr didn't return to Germany but travelled onto the Philippines and then settled in California (Kraehenbuehl 1981, Bretag 2016). It is probable that he left his collections with Mueller, destined for Joseph Hooker at Kew Gardens, but which may instead have been sent to Sonder. Of the 19 Behr collections imaged in the Kew Herbarium Catalogue (2020), all but two (ex Mueller) are from Sonder's herbarium.

The evidence therefore indicates that Behr collected *Lachnagrostis batesii* instead of *L. aemula* or *L. filiformis* in his 1844–1845 trip to South Australia and that either field harvested seed or disarticulated seed (i.e. florets and caryopsis) from the plant collection was passed from Behr or Schlechtendal to Richter in a batch of Australian material for the Luisium Gardens. However, it was Kunze who recognised that the plants raised from seed at Leipzig ex Richter did not conform to *Deyeuxia aemula* Kunth. It may be coincidence, but the only year between 1838 and 1849 that Kunze offered *D. aemula* seed in the Leipzig *index seminum* was in the same year in which he described *A. distans*, suggesting that he obtained seed of *D. aemula* with the express purpose of comparing its resulting plants with *A. distans*. If the *A. distans* seed Kunze received from Richter was harvested in the northern summer of 1846 (i.e. Jun–Aug), then Richter must have received and sown the seed very soon after Behr returned to Germany in May 1846.

The origin of *Lachnagrostis filiformis* and/or *L. aemula* seed in Europe is unknown. Bentham (1878) noted that Australian seed (of unknown source) was used to raise plants in Continental Gardens, which Willdenow (1809) described as *Agrostis retrofracta*, Poir (1810) as *Agrostis debilis* Poir and Kunth (1829) as *Deyeuxia retrofracta*. Koch (1831) notes that he had been growing *A. aemula* in the greenhouse at Erlangen. A review of online surviving *index seminum* (Lut 2017) shows that seed of *A. retrofracta* or *D. retrofracta* was sporadically offered for sale or exchange from as early as 1818 through to 1868, from gardens including, Breslau, Halle, Dorpat, Hamburg, Schwetzingen, Gottingen, Turin, Pisa, Berlin, Madrid, St. Petersburg, Vienna and Uppsala, and *A. aemula* or *D. aemula* seed was offered from 1824 to 1871 from Vienna, Budapest, Erlangen, Breslau, Hamburg, Gottingen, St Petersburg, Dresden, Heidelberg, Pisa, Basel, Angers, and as noted above, from Leipzig. While the seed of *A. retrofracta* and *D. retrofracta* was likely to be of *L. filiformis*, seed of *A. aemula* and *D. aemula* could have been either *L. filiformis* or *L. aemula* or not even consistent among botanical gardens. This is not surprising given the confusion concerning the morphological distinctions between these taxa and

Figure 1. MEL 2124119A: Collection of *Lachnagrostis distans* (Kunze) A.J.Br., by Hans Hermann Behr in 1844–1845 from Angus Park, South Australia, erroneously identified as *Deyeuxia aemula* (R.Br.) Kunth by Dietrich von Schlechtendal in 1847. Image kindly provided by Angharad Johnson, Royal Botanic Gardens Victoria, Herbarium (MEL).

their varying treatment by European botanists at the time. For example, Dumont d'Urville (1832) described the Australian endemic *A. aemula* for New Zealand, collected during the voyage of the *Astrolabe* from 1826–1829, and the *index seminum* from Vienna in 1853 corrected its entry of *D. retrofracta* of the previous year to *A. aemula*. Botanic gardens of the period (as does the nursery industry today), probably accepted seed from other gardens at face value until, and if, they had the capacity to check the veracity of the given names. Some plant lines may well have been grown under false names for many years until corrected, if at all.

Surprisingly, *L. billardierei*, despite being a robust perennial, does not appear in any online 19th century European *index seminum* (Lut 2017). Perhaps Richter did receive seed of *D. billardieri* from Behr's collection, but it failed to establish or survive the cold central European winter. Although all these *Lachnagrostis* taxa are temperate species, *L. billardierei*, being predominately a coastal grass, may be less tolerant of cold altitudes.

There are no specimens of *A. distans* lodged at Naturkundemuseum Leipzig (Karl Heyde 2019, pers. comm., 17th Jan.) or at MNVD in Dessau-Roßlau, nor any documents relating to correspondence between Richter and Kunze in the archives of the former principality and state of Anhalt (Timm Karisch, pers. comm., 17 Apr. 2019).

The earliest collection of *Agrostis distans* that has been found, is at P (Table 1). The collection was made in 1849 by Jean Charles Marie Grenier (1808–1875), a Professor at the Faculty of Sciences at Besançon University and Director of the Jardin botanique de Besançon (Botanical Garden of Besançon) and received from Grenier's herbarium in the year of his death. It consists of two small specimens to about 15 cm tall with just emerging inflorescences and cultivated from seed received from nearby Dijon, probably from the Jardin botanique de l'Arquebuse (Arquebuse Botanical Garden). Although the sheet provides no further information, presumably Dijon received seed from Leipzig to grow plants during the 1848 season. If this is the case, the Grenier collection represents second generation offspring of the parent plants described by Kunze and fourth generation offspring from Behr's original collection.

The *index seminum* for *Hortus Botanicus Imperialis Petropolitanus* first offered seed of *Agrostis distans* in 1853 and then in 1856–1858, 1860–1861 and 1864–65. Specimen sheets at LE (Table 1) indicate that Saint Petersburg Botanical Garden (Russian Academy of Sciences Vladimir Komarov Botanical Institute's Botanical Garden of Peter the Great) received seed collections of *A. distans* from Alexander Carl Heinrich Braun (1805–1877), Director of the University of Berlin Horticultural Gardens, from Heinrich Gustave Reichenbach (1823–1889) at Leipzig University (who appears to have taken up some of Kunze's botanical duties after Kunze's death) and from the University of Karlsruhe Botanical Garden.

Although it is not certain, the sheets at LE probably represent collections made of cultivated plants at Saint Petersburg, rather than collections made elsewhere and sent from donating gardens. If so, those from Berlin and Leipzig were collected in March 1852, while those from Karlsruhe were collected in 1865. A further collection (Fig. 2), probably derived from F6 or F7 generation plants of the pre-1852 seed, was made in 1857 by the Bavarian, Ferdinand von Herder (1828–1896), who worked at the Saint Petersburg Botanical Gardens from 1856–1891. All these collections coincide with seed offerings through the *index seminum*. While LE 01072060 and LE 01072061 have single labels relating to one seed lot, the other sheet labels present a confused picture (Table 1). The label for LE 0107259 refers to both Reichenbach's and Braun's seed, despite the single sheaf of relatively large and robust specimens which were obviously made from a single gathering. The collection is undated, and the seed sources may have been mixed prior sowing. While LE 01072060 depicts relatively small and stunted plants derived from Braun's seed lot, LE 01072062 consists of 16 similar stunted specimens of uniform size, primarily labelled in pencil as Reichenbach's seed lot, but with Braun added in a separate but later and different hand in ink. In addition, LE 01072062 has a separate label referring to Herder's collection of 1865 based on the Karlsruhe seed lot. The implication from this mixed labelling is that the specimens were not mounted until a later era and matching all the labels to their correct respective collections was not possible.

The first of two collections found at W (Table 1) derived from seed received from the Berlin Horticultural Gardens in 1858 and germinated at the Botanischer Garten (Botanical Garden of the University of Vienna) in 1859. The *index seminum* for Berlin (*Index seminum in horto botanico Berolinensi*) listed *Agrostis distans* in

Figure 2. LE 01072061: Collection of *Agrostis distans* Kunze (syn. *Lachnagrostis distans* (Kunze) A.J.Br., by Ferdinand von Herder on the 28.ix.1857 from Hortus Botanicus Imperialis Petropolitanus (St. Petersburg Botanical Garden). Image kindly provided by Dr. Larisa Orlova, Herbarium of Higher Plants (LE), Komarov Botanical Institute RAS, St. Petersburg.

1851–1853, 1855–1856, 1861 and 1867. However, again, any herbarium collections that may have existed at B are likely to have suffered a similar fate to those at Leipzig and no longer exist (Robert Vogt, pers. comm., 22 Dec. 2018). The second collection at W (Table 1) is labelled *'Krakow 17 Aug. 69.'* and came from the herbarium of Reichenbach, who was then Professor of Botany and Director of the Botanischer Garten der Universität Hamburg (Hamburg University Botanical Gardens). The *index seminum* for Hamburg offered *A. distans* in 1867 but whether the 1869 plant collection was sent directly from Kraców (probably from the Ogrody królewskie na Wawelu – Royal Gardens at Wawlu Castle) to Reichenbach or was derived from seed originating in Kraców is uncertain. There are no specimens of *A. distans* in the KRAM collections in Kraców (Beata Paskzo, pers. comm., 13 Feb. 2019).

In section IV of the *index seminum* for Saint Petersburg, 1865 (*Nomina emendata plantarum sub nominibus falsis vel ex hortis variis acceptarum vel in horto nostro antea cultarum* [amended names of plants under false names or accepted from various gardens or previously cultivated in our garden]), is the entry *'Agrostis diffusa* h. Carlsruh. = *Agrostis distans* Knze.'. It is unknown as to which taxon Karlsruhe Gardens was referring to and unfortunately, no *index seminum* from Karlsruhe for the period can be found. Between 1820 and 1824, the *index seminum* for Krzemieniec, Prague and Hamburg Gardens listed *A. diffusa* Host (syn. *A. gigantea* Roth) but by 1865, it is unlikely that this name would still be in use. Another possibility is *A. diffusa* Banks & Sol. ex Hook.f., nom. inval., nom. nud. (syn. *Lachnagrostis billardierei* (R.Br.) Trin.), although Hooker (1853) only used this name for his Flora of New Zealand (i.e. not Australia) and no records of this taxon, under either name, appear in any European *index seminum*. A third possibility is that the name referred to the North American grass, *Agrostis diffusa* Muhl. (syn. *Muhlenbergia sylvatica* (Torr.) Torr. ex A. Gray) but again, this name had been replaced by 1834 and doesn't appear in the *index seminum*. None of these taxa are morphologically similar to *L. batesii*/*A. distans*.

It appears that *Agrostis distans* was only ever cultivated in botanic gardens and did not become naturalised in Europe. Apart from the gardens mentioned on the specimen labels, the species is listed on the *index seminum* for Padua in 1851 (*Delectus seminum horti Patavini, anno MDCCCLI lectorum quae commutanda*), Geneva in 1853 (*Index seminum horti botanici R. Archigymnasii Genuensis en 1853 et offertes en échange par le jardin botanique de Genève*), Breslau (Wrocław) in 1858 (*Delectus seminum in horto botanico Vratislaviensi collectorum*) and Madrid from 1859 to 1861 (*Delectus Seminum Horto Botanico Matritensi*). Madrid also listed *A. distans* from 1875 to 1913 but this may have been a misidentification. Unfortunately there are no voucher specimens at MA to check the veracity of the entries (Leopoldo Medina, pers. comm., 11 Sep. 2020).

Taxonomy

Kunze (1848), in describing *Agrostis distans* included "(*Apera*)" after *Agrostis*. The European/western Asian genus *Apera* Adans. was separated from *Agrostis* L. in 1763, but Dumontier (1823) and Reichenbach (1841, 1842) regarded *Apera* as a section or subgenus, respectively, of *Agrostis*, and it may be Reichenbach's classification that Kunze was alluding to. Trinius (1820) replaced *Apera* with *Anemagrostis* Trin. and segregated some Australian *Agrostis* as *Lachnagrostis* Trin., but later shifted *Apera* into the largely American *Muhlenbergia* Schreb., along with the Australasian *Dichelachne* (Trin. 1924), and subsumed *Lachnagrostis* back into *Agrostis* (Trin. 1841). Currently, in Australia, *Apera*, *Lachnagrostis* and *Dichelachne* are treated as separate genera to *Agrostis* and *Muhlenbergia* (Wilson 2009).

Kunze described *Agrostis* (*Apera*) *distans* as "panicula stricta, ramis remotis, divaricatus, paucifloris; flore sub apice aristato, arista flexa, palea vix longiore; antheris brevitor oblongis" [i.e. panicle tight (straight and rigid), branches remote (separated), widely spread, with few flowers; flower (lemma) with awn near the apex, the awn bended (curved or wavy), the palea scarcely longer (similar length to the lemma); anthers short and oblong]. Walpers (1848–1849) republished Kunze's description, as did Schlechtendal (1851), but the latter did not equate the taxon with his earlier description of *Deyeuxia aemula* (Schlechtendal 1847).

Based on Kunze's (1848) short description (Appendix 1), Bentham (1878) thought it most probable that *Agrostis distans* was synonymous with *Deyeuxia scabra* Benth., nom. illeg., nom. superfl. (syn. *Agrostis scabra* R.Br. nom. illeg., non Willd., *Lachnagrostis rudis* (Roem. & Schult.) Trin.). However, he also included *A. contracta*

F.Muell. ex Hook.f. (syn. *D. contracta* (F.Muell. ex Hook.f.) Vickery), *A. decipiens* R.Br. (syn. *D. decipiens* (R.Br.) Vickery) and collections from Condamine, Qld and New England, NSW (*D. mckiei* Vickery), Upper Huon River, Tas. and Upper Hume River, Vic. (*D. scaberula* Vickery) and Buffalo Ranges, Vic., Dandenong Ranges, Vic. and Sealers Cove, Vic. (*D. rodwayi* Vickery) in *D. scabra*. All of these taxa have awnless or very shortly awned lemmas with the awns arising from near the apex. However, apart from *L. rudis*, none of these taxa have widely spread panicle branches.

Mori (1922) published the combination *Agrostis distans* var. *coreensis* Hack. ex Mori, but it is apparent that in the intention to publish a new variety of *Atropis distans* (Jacq.) Griseb. (syn. *Puccinellia distans* (Jacq.) Parl.), he or the publisher (Enum. Pl. Corea) mistakenly printed *Agrostis* L. instead of *Atropis* (Trin.) Griseb. (syn. *Puccinellia* Parl.). Honda (1930) cited "*Agrostis distans* Griseb. var. *coreensis* Hack. in Mori", when publishing *Puccinellia coreensis* Hack. ex Honda.

Lachnagrostis distans (Kunze) A.J.Br. **comb. nov.**

Agrostis distans Kunze, *Hortus Universitatis Liter. Lipsiensis seminum anno 1847 perceptorum offert delectum*, [1] (1848); *Agrostis distans* Kunze *Linnaea: ein Journal fur die Botanik in ihrem ganzen Umfange, oder Beitrage zur Pflanzenkunde* **24**, 176 (1851), isonym.

Type: "N. Holland [Australia]. Ex seminibus educavit Richterus, hortul. aulic. Dessav., et benevole misit." (neotype, designated here: P 02326274!).

Note: The neotype was chosen as the earliest of the collections found in Europe and therefore the closest cultivated generation to the specimen described by Kunze.

Lachnagrostis batesii A.J.Br., *Muelleria* **26(2)**, 31, 33 (2006).

Type: Scott Creek Conservation Park [South Australia], 15.i.2000, *R.J. Bates 55750* (holotype: AD 149719!; isotypes: MEL 2385265A!, MEL 2385726A!, HO 576079!, K 000607837; NY 4083633).

Illustration: Fig. 1a–d, *fide* A.J.Brown *loc. cit.*

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Muelleria

40: 57–131

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ROYAL BOTANIC GARDENS VICTORIA

Ronald Gunn's Tasmanian 'Agrostid' Grass Collections (Poaceae)

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Introduction

In recent years, an old and 'battered' document was discovered in the archives of the NSW State Library, which on closer examination was found to be a long-lost catalogue of Ronald Gunn's Tasmanian plant collections, taxon numbering system and early consignments (1832–1843) sent to William Hooker (Hobbins *et al.* 2016). The catalogue (Gunn *ca.* 1830–1850) shows Gunn taxon numbers from 1 to 1323, although higher numbers up to 2055 also accompany collections at K (KHC 2021). Even though Gunn's plant specimens are known to be scattered throughout a range of herbaria (Orchard 1999), knowledge of their processing and distribution is largely unknown, and therefore the identification of duplicates and potential types is somewhat hampered. For example, in examining the type specimens for *Agrostis billardierei* var. *setifolia* Hook.f. or *A. aemula* var. *setifolia* (Hook.f.) Vickery, Brown (2019b) noted that there were more than one collection of the same taxon (or the same taxon with different varietal names) which were all labelled *R.C. Gunn 592* or *R.C. Gunn 1446* (or without collection numbers). This presented some confusion when trying to determine the provenance of particular specimens and the designation of types. The current study utilises Gunn's Agrostid grass collections, which represents about a third of the grass taxa he gathered for Hooker, as an example in identifying the duplication and dispersion of the herbarium of a typical mid-19th century, self-taught, colonial botanist.

Abstract

Ronald Gunn made extensive plant collections across Tasmania during the mid-19th century for William Hooker of Glasgow and Kew. Gunn's 'Agrostid' (subtribes Agrostidinae Fr. and Echinopogoninae Soreng) grass collections provide examples of how colonial benefactions were commonly subdivided and distributed to a broad network of botanists. The meagre collection details recorded by collectors of this period, and the practice of mounting mixed collections on the same sheet, results in current confusion when attempting to identify or locate specimens named in field notes or in published taxon descriptions. Nevertheless, 440 herbarium sheets, representing 110 Gunn collections and 495 duplicates, including type specimens, were located in Australian, European and North American herbaria. Lectotypes are designated from Gunn's specimens for eight taxon names.

Keywords: Lawrence, LE TRIN, Hooker, Lindley, Bentham, botanical history, specimen labels, exsiccatae

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Historical background

Ronald Campbell Gunn (1808–1881) arrived in Tasmania from Edinburgh in 1830, taking up the position of Superintendent of a convict barracks in Hobart (Burns & Skemp 1961; Buchanan 1988b). Over the next decade, he was a Police Magistrate at Launceston, Stanley (Circular Head) and Hobart. Gunn's interest in botany stemmed from his friendship with Robert W. Lawrence (1807–1833), the son of an influential landholder at Formosa and Penquite, in the Launceston area (Burns & Skemp 1961; Wall 1967). Lawrence introduced Gunn by letter, in June 1832, to the eminent British botanist, William Jackson Hooker (1785–1865) at Glasgow University, who was seeking collectors of the Tasmanian flora (Buchanan 1988b). A month later, Gunn sent a batch of plant collections to Hooker from Launceston, the first of many consignments he forwarded over the next decade and a half. Although they never met, Gunn and Hooker kept up a more or less regular correspondence over many years until Hooker's death, not only in relation to collections supplied from Van Diemen's Land and books and equipment supplied from England, but also in regard to botanical matters and news of mutual botanical associates. By 21 April 1838, Gunn was able to write to Hooker: "You and I are now old friends – we can actually afford to quarrel, if need were, and make up friends again – but I trust no such necessity shall ever exist." (Burns & Skemp 1961).

In October 1838, Gunn moved from Circular Head back to Hobart as Third Member of the Convict Assignment Board and Second Assistant Police Magistrate and in 1840, became Private Secretary to Sir John Franklin, Lieutenant-Governor of Van Diemen's Land (Burns & Skemp 1961). At every opportunity and in every place he lived, Gunn enthusiastically made plant collections (Buchanan 1988b) to send to Hooker. Gunn's Catalogue (Gunn *ca.* 1830–1850) and his letters to William Hooker (Burns & Skemp 1961) indicate that he progressively allocated numbers to the plant taxa he sampled, rather than assigning new numbers to every individual specimen he collected. He specifically lists the taxon numbers that correspond with the years he sent shipments of specimens to Hooker. In most of his consignments, Gunn included further examples or better specimens of those he had previously sent, labelling them with the original numbers he had assigned to those taxa. Consequently, it is often only a collection date or dispatch date that can separate collections of the same taxon.

William Hooker's son, Joseph Dalton Hooker (1817–1912) arrived in Hobart in August 1840 as Surgeon-Botanist for the Antarctic Expedition of Captains Ross and Crozier on the ships '*Erebus*' and '*Terror*' (Ramsland 2011). In the three months available to them, while a permanent station was established for making magnetic observations, Gunn and Hooker botanised around Hobart and Gunn arranged for Hooker to visit Port Arthur, the Lakes district and Marlborough in the Derwent Valley. They appear to have enjoyed this time immensely as Hooker wrote in the forward to his 'introductory essay to the flora of Tasmania' (Hooker 1859): "I can recall no happier weeks of my various wanderings over the globe, than those spent with Mr. Gunn, collecting in the Tasmanian mountains and forests, or studying our plants in his library....". Early in 1841, Gunn resigned his government positions in Hobart to manage the Lawrence estates around Launceston. When the Antarctic Expedition returned to Hobart in April 1841 (Ramsland 2011), for a three-month refit, Gunn was laid up with a broken leg and unable to undertake further collecting trips with Hooker or to be part of the long-awaited Vice-regal overland expedition to Macquarie Harbour with Lieutenant-Governor and Lady Franklin (Burns & Skemp 1961; Buchanan 1988b). On Hooker's return to England in September 1843, Gunn began an ongoing correspondence with him as well as with his father, sometimes sending plant specimens to Joseph for William and vice versa. Specimens destined for Joseph's attention largely consisted of ferns, fungi, woods and fossils.

In 1843, Gunn also took over management of the Franklin estates in Tasmania, following Sir John's recall to England (Buchanan 1988b). Franklin had instituted the Tasmanian Natural History Society in 1838 to promote scientific enquiry and Gunn was installed as its Secretary from 1840, in addition to being Secretary of the Hobart Town Horticultural Society and President of the Launceston Horticultural Society (Burns & Skemp 1861). Soon after his arrival, the new Governor, Sir Eardley Wilmot established a Horticultural and Botanical Society in Hobart, largely to take control of the Hobart Botanic Gardens but it was also seen by many as a replacement

for the Tasmanian Society (of which Wilmot was de facto President) and the Horticultural Society (Burns & Skemp 1961). Wilmot's heavy-handed approach annoyed Gunn and many fellow members, who consequently withdrew their support of the new scheme and continued to run the Tasmanian Society, independently from Launceston. It was not until 1848, with the arrival of Wilmot's replacement, Sir William Denison that the two societies were amalgamated into the Royal Society of Tasmania, with Dr Joseph Milligan as Secretary. With Gunn's increasing land management responsibilities, including the acquisition of his own properties, acting as Agent for the Van Diemen's Land Company during the 1850s and the taking up of various public affairs interests (e.g. seat in the House of Assembly, Deputy Commissioner of Crown Lands, Clerk of the Peace), his capacity for plant collecting diminished accordingly (Burns & Skemp 1861; Buchanan 1998b). However, in a letter to Joseph Hooker dated 2 May 1870, Gunn apologises for a "correspondence long interrupted" due to "domestic affliction" (the death of a number of children), "heavy pecuniary loss" (£20,000) and "broken health" (rheumatism) (Earp 2014).

William Hooker became the Director of the Royal Gardens at Kew in 1841, taking his large private herbarium with him, which was substantially added to by collections made by his son Joseph, not only from Australasia and the Antarctic, but from India and the Himalayas, Palestine, Morocco and the Western United States (Allan 1967; Goyner *et al.* 2012). After his death in 1865, and when Joseph took over the Kew Directorship, the Hooker Herbarium was purchased by the State and was officially amalgamated with the pre-existing collections of George Bentham and W.A. Broomfield. Each of Hooker's herbarium sheets received the stamp 'Herbarium Hookerianum 1867'.

Although Gunn sent the bulk of his plant collections to William Hooker, from as early as July 1833, he indicated to him that he had "sent a small box of Specimens to John Lindley Esqe London" and in a letter dated 6 December 1843, accompanying three cases of plants, he notes "I have sent Duplicates of your Collections to Lindley [University College London] and Brown [Keeper of the Botanical Department, British Museum]" (Burns & Skemp 1961). For some plant consignments, he requested that the recipients forward part of the collections to other botanists plus a small, identified piece back to himself. Although it was common for herbaria during the late 18th and early 19th centuries to exchange specimens and distribute duplicates, many sheets contained little collection information as field notes were generally scant and original collecting labels were rarely, if ever, faithfully copied (Massey 1974). In addition to this scattering of herbarium material, private collections or parts thereof were sometimes sold or bequested to other herbaria.

Apart from the collections Ronald Gunn sent to England, he maintained his own private herbarium at his home at Penquite, Tasmania. In early 1876, a few years before his death, he presented his collection to the Royal Society of Tasmania, where it was housed in the Tasmanian Museum (Weld 1877). His "collection had become much disarranged, and as many of the plants and much of the paper were quite destroyed, it was found necessary to re-name and re-paper the whole", a task undertaken by two society members, Rev. W.W. Spicer and J.R. Scott Esq. In about 1904, the collection was transferred to Sydney for study under the auspices of Joseph Henry Maiden (Buchanan 1988b). Unfortunately, World War 1 and the Great Depression reduced the capacity of the NSW Herbarium to undertake the planned studies. Duplicates of some collections were eventually sent back to Hobart and are now lodged at HO. Further duplicates of Gunn's collections may be among a large set of HO sheets with the label 'ex herb. Botanic Gardens, Hobart' but there are no collection details noted whatsoever. These sheets probably represent 724 specimens retained at the Gardens as a reference set in 1946, when the bulk of the Tasmanian Museum's herbarium was transferred on loan to the University of Tasmania at Sandy Bay (Parham 1976). The Gardens reference set was transferred to HO in 1976.

19th Century grass nomenclature

The Agrostidinae Fr. and Echinopogoninae Soreng[1] collected by Gunn in Tasmania included taxa from *Agrostis* L., *Lachnagrostis* Trin., *Deyeuxia* Clarion ex P.Beauv., *Dichelachne* Endl., *Pentapogon* R.Br.,

1 Soreng *et al.* (2017) separated *Dichelachne*, *Pentapogon* and *Echinopogon* from subtribe Agrostidinae Fr. into subtribe Echinopogoninae Soreng, based on genetic work.

Echinopogon P.Beauv. and *Polypogon* Desf. (hereafter designated as 'Agrostid' grasses), and represent about a third of the 40-odd grass taxa he sent to Hooker. At the time that Gunn collected his specimens, the state of plant systematics in Europe and America was in a constant state of flux as botanists attempted to incorporate discoveries from the New World into contemporary classification systems. Species and genera delimitation were by no means settled. Consequently, most of the taxa Gunn encountered, were known by a variety of names. The Hookers, and Joseph in particular, discouraged colonial plant collectors from naming the new taxa they came across (Hansen 2013). They believed that only a large herbarium, such as Kew, was able to correctly examine variation across and between taxa and thereby delimit genera and species boundaries (Bonneuil 2002). Using the argument of being in the best position to apply a global perspective, the Hookers also considered that the names they gave a new species should take precedence over any applied by field botanists, even if the original specific epithet was not conserved when transferring a plant to another genus – a practice which became known as the 'Kew Rule'. Other eminent institutional botanists, such as Alphonse de Candolle (1806–1893) at the University of Geneva and Asa Gray (1806–1888) at Harvard University, also took the same position, in expecting that the names they applied to taxa should be universally accepted. The fact that they were often not in a position to study variation in the field, but only from dried specimens, these botanists were more inclined to 'lump' taxa together under the one name, in spite of the 'splits' that their colonial collectors observed (Endersby 2001).

Robert Brown (1773–1858), naturalist on Matthew Flinders' '*Investigator*', was the first botanist to publish a treatment of the Australian flora using de Jussieu's 'natural system' of classification (i.e. groups defined by multiple characters), and his '*Prodromus Florae Novae Hollandiae*' (Brown 1810) became the standard flora on the subject for many decades. He treated *Lachnagrostis*, *Deyeuxia*, *Dichelachne* and *Echinopogon* as synonymous with *Agrostis*.

Only two of the nine currently recognised native Tasmanian *Agrostis* taxa were known in Gunn's collecting years. The first was *Agrostis parviflora* R.Br. (syn. *Vilfa parviflora* (R.Br.) P.Beauv., *Sporobolus parviflorus* (R.Br.) Kunth, *Agrostis intricata* Nees). The second taxon was *Agrostis venusta* Trin., but not formally described (Trinius 1841) until five or six years after Gunn first collected it as no. *593* and part of his 1835 consignment to Hooker. In his catalogue, Gunn noted that *593* was probably the same as his *1008* collected in 1837 from 'C. H[D.] [Circular Head] log fence, lagoon', and named it *Lachnagrostis willdenowii* (Gunn *ca.* 1830–1850). As his catalogue notes on grasses contain no dates more recently than 1837, Gunn must have equated these collections with *L. willdenowii* Trin., published in 1824 and based on *Agrostis retrofracta* Willd.

Three of Robert Brown's Tasmanian *Agrostis* taxa (*A. aemula*, *A. billardierei* and *A. scabra* non Willd.) were transferred to *Lachnagrostis* by Trinius (1820) as *L. aemula* (R.Br.) Trin., *L. billardierei* (R.Br.) Trin. and *L. rudis* (Roem. & Schult.) Trin., respectively, along with *Avena filiformis* G.Forst. (syn. *Agrostis forsteri* Roem. & Schult.) as *L. filiformis* (G.Forst) Trin. Kunth (1829) placed these taxa in *Deyeuxia* (as *D. aemula* (R.Br.) Kunth., *D. billardierei* (R.Br.) Kunth, *D. scabra* (R.Br.) Kunth. and *D. forsteri* (Roem. & Schult.) Kunth) but Steudel (1840) placed them in *Calamagrostis* Adans., (as *C. aemula* (R.Br.) Steud., *C. billardierei* (R.Br.) Steud., *C. rudis* (Roem. & Schult.) Steud. and *C. forsteri* (Roem. & Schult.) Steud.). By 1840, Trinius had abandoned his *Lachnagrostis* and placed the species back in *Agrostis* (Trinius 1841). Nevertheless, Nees von Esenbeck (1843) retained *Lachnagrostis* (occasionally interchanged with *Lasiagrostis* Link (syn. *Achnatherum* P.Beauv. on herbarium labels and in text), but Hooker (1853) utilised *Deyeuxia* for these taxa.

Although Trinius (1820) had published *Lachnagrostis aemula* and *L. filiformis* as separate entities, by 1841 he regarded *Agrostis aemula* (syn. *L. aemula* (R.Br.) Trin.), *A. forsteri* (syn. *L. filiformis* (G.Forst.) Trin.) and *A. retrofracta* Willd. (syn. *L. willdenowii* Trin.) as synonymous. This synonymy was upheld by Hooker (1853) under *Deyeuxia forsteri*, by Hooker (1858) under *A. aemula*, by Mueller (1864) under *A. solandri* F.Muell. and by Bentham (1878), under *D. forsteri*, again.

Neither Trinius (1841) or Nees von Esenbeck (1843) noted *Lachnagrostis rudis* (Roem. & Schult.) Trin. (syn. *Agrostis scabra* R.Br. non Willd., *A. rudis* Roem. & Schult.) in their papers, although Nees von Esenbeck (1843) introduced *A. aequata* Nees, based on a Gunn collection (18.i.1838, *Gunn 1005*). Brown (2006) regarded

L. aequata (Nees) S.W.L.Jacobs as a synonym of *L. scabra* S.W.L.Jacobs, nom. inval., but later legitimised the taxon's name as *L. rudis* (Brown 2015).

There are four Robert Brown *Agrostis* names currently associated with Tasmanian *Deyeuxia*. The most common taxon of these is *A. quadriseta* (Labill.) R.Br., now known as *D. quadriseta* (Labill.) Benth. Forms of this highly variable species were separately described as *A. cylindrica* R.Br. and *A. lobata* R.Br., which Vickery (1940) equated to *D. quadriseta* var. *cylindrica* (R.Br.) Vickery and *D. quadriseta* f. *D*, respectively. In addition, Trinius (1841) described *Agrostis diaphora* Trin. which Vickery (1940) regarded as part of her *D. quadriseta* f. *B*. and Hooker (1858) described *A. quadriseta* var. *paniculata* Hook.f., which was equated by Vickery (1940) to *D. quadriseta* f. *G*, and *A. quadriseta* var. *montana* Hook.f. (not cited by Vickery (1940)). Apart from Palisot de Beauvois (1812) who treated most of the Agrostids as *Vilfa* Adans. and Nees von Esenbeck (1843) who placed *A. quadriseta* and *A. lobata* in *Bromidium* Nees & Meyen, all these taxa remained in *Agrostis* until Bentham (1878) transferred them to *Deyeuxia*, along with *A. montana* R.Br. nom. illeg. non Krocker as *D. montana* (R.Br.) Benth. nom. illeg. non P.Beauv. (syn. *D. monticola* (Roem. & Schult.) Vickery).

An additional *Deyeuxia* among Gunn's collections is *D. gunniana* (Nees) Benth. Although it seems odd in light of modern generic concepts, Nees von Esenbeck (1843) described this taxon as *Echinopogon gunnianus*, probably on the basis of its rather stout lemma awn and stiff panicle. He appeared to equate its characteristics ("characteres genericos sane *Echinopogoni ovata* coniunctissimus est, sed habitu alieno *Agrostis albae*") with both the native *Echinopogon ovatus* and the European *Agrostis alba* (syn. *A. gigantea* Roth).

Brown (1810) included the currently accepted *Dichelachne* species within *Agrostis* as *A. crinita* (L.f.) R.Br., *A. sciurea* R.Br. or *A. rara* R.Br. but these taxa have since had a very complex nomenclature history. Roemer and Schultes (1817), Kunth (1829) and Steudel (1840) also treated these taxa as *Agrostis*. However, they were regarded as species of *Apera* Adans. or *Vilfa* Adans. by Palisot de Beauvois (1812), as *Cinna* L. by Trinius (1820), and as *Muhlenbergia* (orth. var. *Muehlenbergia*) Schreb. by Trinius (1824, 1841) and Nees von Esenbeck (1843). Trinius and Ruprecht (1842) placed them in *Dichelachne*, where they have more or less remained since. However, the names applied to individual taxa have also been confused over time. Trinius and Ruprecht (1842) equated *Dichelachne vulgaris* Trin. & Rupr. to *Agrostis crinita* (L.f.) R.Br., *Agrostis rara* Nees non R.Br. and *Muhlenbergia sciurea* (R.Br.) Trin. The name *Dichelachne hookeriana* Trin. & Rupr. was applied to *Anthoxanthum crinitum* L.f. (Labillardière 1805: "Nov. Holl. No. *2*") and *Dichelachne forsteriana* Trin. & Rupr. was applied to *Anthoxanthum crinitum* (Forster 1786: "No. *18* ….. Noua Zeelandia") and *Muhlenbergia crinita* (L.f.) Trin. (ex Trinius 1824). They gave the name *Dichelachne comata* Trin. & Rupr. to *Agrostis rara* R.Br. and *M. crinita* (L.f.) Trin. (ex Trinius 1841) and the name *Dichelachne sieberiana* Trin. & Rupr. to *Agrostis sciurea* R.Br. and *Stipa micrantha* Cav. A new entity, *Dichelachne longiseta* Trin. & Rupr., was also recognised. Currently, *Anthoxanthum crinitum*, *Agrostis crinita*, *Muhlenbergia crinita*, *M. mollicoma* Nees, *Dichelachne. longiseta*, *D. comata* and *D. hookeriana* are treated as synonymous with *Dichelachne crinita* (L.f.) Hook.f., while *A. sciurea*, *M. sciurea*, *Dichelachne sciurea* (R.Br.) Hook.f., *D. vulgaris* and *S. micrantha*, are synonymous with *Dichelachne micrantha* (Cav.) Domin. and *A. rara* and *M. rara* are synonymous with *Dichelachne rara* (R.Br.) Vickery (Simon *et al.* 2009). The name *Dichelachne sieberiana* Trin. & Rupr. (tentatively equated to *D. sieberiana* var. *anomala* Trin. & Rupr.) is currently applied to *D. sciurea* var. *setifolia* Benth., *D. micrantha* var. *setifolia* (Benth.) Domin. and *D. rara* subsp. *asperula* Veldkamp (Simon *et al.* 2009).

The last native Tasmanian Agrostid names to consider here are *Agrostis ovata* G.Forst. and *Pentapogon billardierei* R.Br. The former was transferred to *Echinopogon ovatus* (G.Forst.) P.Beauv. in 1812 and was generally accepted as such, except that Kunth (1829) and Steudel (1840) called it *Cinna ovata* (G.Forst.) Kunth. Brown's *Pentapogon billardierei* was the taxon's accepted name until Baillon (1894) published its correct name as *P. quadrifidus* (Labill.) Baill. based on *Agrostis quadrifida* Labill.

Materials and Methods

A broad search was made of Australian, European and North American herbaria for Robert Gunn's Tasmanian collections of *Agrostis*, *Lachnagrostis*, *Deyeuxia*, *Echinopogon*, *Dichelachne*, *Pentapogon* and *Polypogon*, through interrogation of online databases (e.g. AVH 2021; BioPortal 2020; CHG 2018; JACQ consortium

2004 ff.; KHC 2021; MNHN 2020; NANSH 2020; RBGE Herbarium Catalogue 2020; NHM (BM) 2018; SVH 2020; Seregin 2020 – Moscow Digital Herbarium; Virtual Herbarium Berolinense 2018) and email contacts with curation managers. Following this initial survey, Gunn Agrostid grass collections at E, HO, K, NSW and S (through loans) and at CGE, K, MEL, P and W (through visits) were examined in respect to the determination of the specimens and the annotations on each sheet. These collections were supplemented with information from images of databased sheets online (B, BM, G, L, US and VT) or of non-databased sheets provided by curation staff (C, GH, GOET, LE, M, NY, OXF, TCD, UPS, WU and Z+ZT). Two collections at NSW were not sighted due to their inaccessibility at the time of writing, during the herbarium's relocation from Sydney to Mount Annan. See Index Herbariorum (2019) to decipher herbarium codes.

Label styles and type specimens were examined, and where possible, handwriting on labels or sheets were compared to known examples by various botanists in an attempt to track the movement of collections throughout Europe and the United States.

Results and Discussion

Sheets and labels

Although it is unlikely that every herbarium sheet of Agrostid grass collections by Gunn and his associates was located in this study, 495 duplicates on 440 sheets were found, representing 110 collections of either single or mixed field samplings of 20 taxa (App. 1). Three quarters of the specimens from Gunn collections were lodged at either K, NSW, W, CGE, P, GH, HO, G, US, E and NY while the remainder were scattered between TCD, L, GOET, C, S, Z+ZT, WU, OXF, LE TRIN, UPS, MEL, VT and BM. Herbaria (or herbarium virtual sites) reporting a lack of Gunn Agrostid grass specimens included AD, B, BP, BR, BRI, CANB, DBN, DNA, DR, GZU, HAL, KIEL, KRAM, LD, LIV, MA, MANCH, MW, PERTH, PH, PR, PRC and WELT. Lawrence collections were tentatively identified at LE TRIN, K, HO, W, E and NSW and Everett collections were found at CGE only. Lander (1988), in a compilation of 390 Gunn's collection sheets of some 30 *Olearia* Moench, taxa, found a similar range of European herbaria with and without Gunn collections, except that none were found at E and a few were found at FI. No data was presented for W/WU, GOET, Z+ZT, C or S/UPS. Compared to one Agrostid grass at BM, there are 46 *Oleraria* collections. Other differences are that K and HO have more than twice the *Olearia* collections compared to Agrostid grasses, and although NSW and HO together have similar numbers of sheets of each taxonomic group, HO has only a quarter of the grass sheets as compared to NSW.

Some Gunn Agrostid grass sheets were missing collection dates, many had no location or specific location, other than 'Van Diemen's Land' or 'Tasmania' and some were missing collection numbers. A few sheets were identified by their collection number and date only, having no reference to Gunn. Missing information was particularly prevalent where duplicates had been forwarded from Hooker at K to other herbaria. Many of Gunn's specimens at K have a range of taxon determinations made by a range of hands, including William and Joseph Hooker and George Bentham and more recently by Australian agrostologists, Joyce Vickery (1908–1979) and Surrey Jacobs (1946–2009).

Despite the difficulties associated with lack of details, almost all collections cited by Nees von Esenbeck (1843), Hooker (1858) and Bentham (1878) were identified, or at least, collections were found which are most likely to be those referred to by these authors. All of Vickery's (1941) cited collections were also identified, except for four collections of *Agrostis venusta* (*Gunn 1008*) and despite extensive searches at NSW, HO, K and CGE, these collections could not be found. They may in fact not exist and only represent a recording error in her original manuscript. Nevertheless, they have been included in Appendix 1 with attending comments. In addition to these unlocated collections, Vickery (1941) placed a range of Australian collections of *Agrostis* under the American grass *A. hiemalis* (Walt.) Britton, Sterns & Poggenb., noting "Without exact locality or number, *Gunn* (mixed with *Agrostis aequata* and *A. venusta*)". Jacobs (2001) assigned Vickery's Australian *A. hiemalis* to his new species, *A. propinqua* S.W.L.Jacobs and *A. bettyae* S.W.L.Jacobs, and although mixed collections in the current study were found that contained *A. venusta* with *A. parviflora* (K 000838277–79: Fig. 1), no mixed collections, or otherwise, containing *A. propinqua or A. bettyae* or including *Lachnagrostis rudis* (syn. *A. aequata*) could be located. In her paper, Vickery (1941)

Figure 1. K 000838277–79: an amalgamation of Ronald Gunn collections with his original labels.
a. *Agrostis parviflora*, *Gunn 1011* (K 000838277) from Gunn's '1837' consignment to William Hooker, with Joseph Hooker's determination according to Nees von Esenbeck (1843) nomenclature;
b. *A. parviflora* (K 000838279) & *A. venusta* (K 000838278) [pencil det. by J. Vickery], *Gunn 1448* from Gunn's 1846 consignment, with J. Hooker's determination [crossed out];
c. J. Hooker's determination for *Flora Tasmaniae* (Hooker 1858);
d. George Bentham determination for *Flora Australiensis* (Bentham 1878).
Image accessed from http://specimens.kew.org/herbarium/K000838277

notes "With some hesitation I have placed the following Australian specimens with the widespread and variable American species *Agrostis hiemalis*."

A few new taxa have been segregated from Gunn's and Lawrence's collections since 1858 and therefore their names were unavailable to William or Joseph Hooker. These taxa include *Deyeuxia densa* Benth., *D. frigida* F.Muell. ex Benth. (syn. *Deyeuxia accedens* Vickery), *Deyeuxia innominata* D.I.Morris, *D. lawrencei* Vickery, *D. rodwayi* Vickery, *D. scaberula* Vickery and *Pentapogon quadrifidus* var. *parviflorus* (Benth.) D.I.Morris.

Grasses were not sent in every consignment to Hooker. Gunn's notes and letters show that grass specimens were included in the consignments of 1833 (nos. 130–443, collected 1832–1833 season, sent July 1833), 1835 (nos. 444–630, collected 1834–1835 season, sent May 1835), 1836 (nos. 631–772, collected 1835–1836 season, sent November 1836), 1837 (nos. 773–1017, collected 1836–1837 and 1837–1838 seasons and sent April 1838) and 1846 (collected 1838–1846, sent December 1846) (Burns & Skemp 1961). In the letters accompanying most of these consignments, Gunn mentioned that he had included duplicates of taxa from former consignments. Most of the grass collections Gunn made and noted in his catalogue from 1833–1836 (Gunn *ca.* 1830–1850), are not listed at K (KHC 2021) and may have been dispersed or lost before Hooker moved to Kew Gardens in 1841, or they remain to be located. For example, of Gunn's first recorded grass collections in his 1833 consignment: no. *337 Hierochloe redolens* (Vahl.) R.Br. ex Roem. & Schult. (as *H. australis*), no. *414 Distichlis distichophylla* (Labill.) Fassett (as *Poa distichophylla* (Labill.) R.Br.), no. *417 Hemarthria uncinata* R.Br. and no. *418 Phragmites australis* (Cav.) Trin. ex Steud. (as *P. communis* Trin.) (Gunn *ca.* 1830–1850), only the last may be traceable to E 00666803, sent from Joseph Hooker to Major Munro in 1852 and bequeathed to Kew on Munro's death. However, without a collection label, it is impossible to be certain if this is Gunn's original collection of this taxon or a later collection. Among Gunn's 1835 and 1836 consignments, the undated K 000913404 of *Gunn 589 Dichelachne crinita* (again, sent by Hooker in 1852 to Munro and returned to K on Munro's death), K 000873419 of *Gunn 588 Austrostipa pubinodis* (Trin. & Rupr.) S.W.L.Jacobs & J. Everett (ex Munro) and K 000838419 of *Gunn 771 Deyeuxia quadriseta* may represent residual specimens from early dispersal of duplicates by Hooker.

A brief review of databased images at K (KHC 2021) show that the earliest Gunn collections made in 1832, 1833, 1835 and 1836 have no associated Gunn label. Instead, William Hooker has written some sample details directly on the sheets, including 'Mr. Gunn Van. D. Land.' or 'Gunn V.D.L.' and one or more of: a taxon number, a collection location and a collection year (presumably the year of dispatch). Some of these early collections have a 'Gunn V.D.L.' and collection year, written in a bold, unknown hand, either directly on the sheet or on a label. Sometimes, a collection from 'Lawrence V.D.L.', written in the same hand, is mounted on the same sheet. These sheets and some in future batches often bear a separate note from Gunn on habit and habitat. The collections sent from the 1837 consignment and later, usually have a full Gunn label bearing the location and date of the collection and the taxon number underscored with the consignment year in Gunn's hand (Fig. 1a) but sometimes one or more collection details are missing (Fig. 1b). On these labels or on the sheets themselves, the taxon name is often included by either Joseph Hooker (Fig. 1a, 1b, 1c) or George Bentham (Fig. 1d). Occasionally where Gunn's details are missing, the relevant information has been added later. Commonly, more recent specimens with their associated labels are mounted on earlier sheets of the same taxon (Fig. 1) or mixed with collections from other collectors.

Some obvious gaps appear in the data-set and particularly for early collections (i.e. pre 1837). For example, no *Gunn 590 Echinopogon ovatus* pre 1844, *Gunn 592 Lachnagrostis aemula* pre 1840 or *Gunn 593 Agrostis venusta* collections could be found at HO or NSW, despite a number of sheets of these taxa being lodged at K, CGE, W or E. Original duplicates for Lawrence's collections at HO or NSW are rare, unless they are unidentifiably mixed with Gunn's collections. Much of the source material for Lawrence and early Gunn collections in continental Europe is missing from K and suggests that little was kept back from distribution, once new and better replacement material (e.g. *Gunn 1006 L. aemula* and *Gunn 1008 L. venusta* from the 1837 consignment) was received by Hooker and Lindley.

Fellow collectors

Not all collections sent by Gunn to Hooker were his own. Following Hooker 's model of recruiting colonial

collectors, Gunn not only utilised his servants as plant collectors, but recruited fellow colonials to collect for him (Burns & Skemp 1961). He thereby acted as a self-appointed 'gate-keeper' of specimens flowing between Tasmania and Glasgow/Kew (Cave 2012). However, as a consequence, in the earlier collecting years, and particularly before Gunn developed a more sophisticated recording system, the original source of some collections, now attributed to him, are difficult to ascertain. In numerous cases, Gunn acknowledged his collectors by noting their initials in the corner of his specimen labels (Buchanan 1988b) but it is not at all certain that he did so in every case.

Robert Lawrence: Even though Gunn probably made several short collecting trips with his friend Robert Lawrence, their collections and numbering systems were kept separate (Hooker 1834). A handful of collections at HO and NSW, presumably derived from Gunn's herbarium, have what is assumed to be an original Lawrence (as RWL) pencilled label, including his taxon number, with a Gunn taxon number added to it later (e.g. HO 130013 '*RWL 61*, *Briza minor* L., *594*' [*594* being Gunn's no.]; NSW 116504 '*588*, *RWL 55*' [*588* being one of Gunn's nos. for *Austrostipa mollis* (R.Br.) S.W.L.Jacobs & J.Everett]; HO 99346 '*RWL 249*, *993*' [*993* being Gunn's no. for *Vulpia scabra* (R.Br.) Nees syn. *Anthosachne scabra* (R.Br.) Nevski]). No such labels have been found on Kew collections. After Lawrence's untimely death in 1833, his father continued to grant Gunn access to his son's private herbarium but did not want it to go to Hooker (Burns & Skemp 1961). On 31 July 1838, Gunn wrote to Hooker that he had looked through Lawrence's collections but found them to be "very meagre now as compared to my own; he erred at first, as I did, in retaining most untenably small specimens, and in many cases none, merely noting some general thing, assumed name, by which he might probably have been enabled to remember the plant, but which is no guide to me." (Burns & Skemp 1961). This comment may be an indication of why the earliest Gunn grass collections sent to Hooker are difficult to locate. Once Hooker received better collections of the same taxa from Gunn in later years, he may have discarded the originals, added them unreferenced to the newer sheets or given or exchanged them away to other collectors.

James Backhouse and Joseph Milligan: On 1 July 1833, accompanying his consignment of 113 angiosperm specimens, Gunn mentioned to Hooker that he included some specimens from James Backhouse (a Quaker Missionary and a keen botanical collector) (Burns & Skemp 1961). Again, on 30 March 1835, Gunn writes: "... though I have myself been unfortunately prevented from any extended excursions – friend Backhouse .... assisted me much" (Burns & Skemp 1861). In 19 June 1837, he wrote "Mr Backhouse is again here. He is going to send you a most valuable Collection of New Holland Plants immediately – with notes – which I am sure will be invaluable... " (Burns & Skemp 1861). In between visits to Tasmania, Backhouse extended his missionary journeys (and plant collecting) to all the Australian colonies before returning home to England in February 1838 (Trott 1966) but over the following years, he kept up an ongoing correspondence with the Royal Society of Tasmania. Many of Backhouse's collections at K are mounted on the same sheets as those from Gunn and Lawrence and sometimes it is difficult to discern which specimens belong to which collector.

On 14 September 1834, Gunn wrote to Hooker about receiving specimens from Joseph Milligan (a surgeon and superintendent for the Van Diemen's Land Company and future brother-in-law to the then deceased Robert Lawrence) to forward on (Burns & Skemp 1961). Gunn accompanied Milligan on a collecting trip into north-west Tasmania during February 1837 (Buchanan 1988b) and on 31 March 1837 he writes to Hooker that "My collection as a whole will illustrate a great number of my older Nos. of which I never obtained very good specimens, & I have also now collected many myself for the first time, having received my only specimens from Mr Backhouse, Dr Milligan or others." (Burns & Skemp 1961). On 31 October 1841 Gunn again writes to Hooker, "Dr Milligan is about to leave the Hampshire Hills & settle in Launceston. This I am sorry for as he was a useful agent in that part of the Colony. He has promised however to make a large Collection before he leaves this summer." (Burns & Skemp 1961).

Although Milligan used his own numbering system for his collections, there is evidence that Gunn relabelled some, at least, of those he received from Milligan, with his own numbers (Buchanan 1988a). One example among the grasses can be seen with K 000702067 *Gunn 770 'Agropyron velutinum* Nees' (syn. *Australopyrum velutinum* (Nees) B.K.Simon). The sheet appears to be

a combination of specimens collected with Joseph Milligan during February 1837: one label noting '*770*, 1837, Tasmania, R. Gunn, Chilton, Surrey Hills, Feb 1837' and the other '*770*, ~~*JM 173*~~, Middlesex Plains'. A review of the 30-odd identifiable Milligan grass collections at HO and NSW (Table 1), show the same range of Agrostid grass species collected by Gunn and as a consequence, some 'Gunn' collections could actually have been made by Milligan. Although Milligan didn't specifically collect for Hooker, there are 66 of his collections (only two grasses) databased at K (KHC 2021). Those from the 1830s were presumably sent by Gunn, as they are often mounted with Gunn's collections on the same sheet. Milligan collections from the 1840s were probably sent directly to K by Milligan or from the Royal Society of Tasmania at a later date. Milligan was secretary of the Royal Society from 1848 to 1860, after which he left Tasmania to live out the rest of his days in England (Hoddinott 1867). He donated his herbarium to the Tasmanian Royal Society in 1852 but his collections were not mounted and organised until 1875 when the Rev. W.W. Spicer undertook the task (Hobart Mercury 1875).

Charlotte Smith and Mary Ballantyne: Some of Gunn's other associates also collected specimens for him (Burns & Skemp 1961; Buchanan 1988b). In particular, and with regard to grasses, the names or initials of John Grant Smith, storekeeper for the Van Diemen's Land Company at Circular Head and his wife Charlotte, and Mary Ballantyne (or Ballantine) of Kenmore, Macquarie Plains near New Norfolk, appear on some of Gunn's collections (Hooker 1858; AVH 2021; App. 1B, 1C).

Although John Smith collected the *Gunn 584* specimen of *Spinifex sericeus* R.Br. (as *'S. hirsutus'* Labill.) in vii.1835 from Woolnorth (Gunn *ca.* 1830–1850), the Van Diemen's Land Co. Estate at Cape Grim, most of his collections appear to have made during 1839 around

Table 1. Tasmanian Agrostid grass collections at HO and NSW (AVH 2020) attributed to Joseph Milligan and William Archer with possible affinities to Ronald Gunn's collections.

Taxon	Joseph Milligan (1807–1884)		William Archer (1820–1874)	
	Coll. No.	Herb. Cat. No.	Coll. No.	Herb. Cat. No.
Agrostis australiensis			Archer s.n. Archer 6	NSW 943091 NSW 548823(b)
Agrostis parviflora			Archer 6	NSW 548823(a)
Agrostis venusta			Archer s.n. Archer 42 Archer s.n.	HO 515603 HO 515605 NSW 548418
Deyeuxia monticola			Archer 33 Archer 36 Archer s.n.	HO 36820(a) HO 36820(b) NSW 548975
Deyeuxia quadriseta	Milligan 203 Milligan 203 Milligan 203 Milligan 203	HO 516906 HO 516910 NSW 549201 NSW 549221	Archer 31 Archer s.n. Archer s.n. Archer 35	NSW 549208 NSW 549209 NSW 549211 NSW 549213
Deyeuxia rodwayi			Archer 34 Archer s.n. Archer 33 Archer s.n.	HO 36821 NSW 549660 NSW 549665 NSW 549719
Deyeuxia scaberula			Archer s.n.	NSW 549598
Dichelachne crinita	Milligan 424 Milligan 424	HO 516920 HO 516922	Archer 1	NSW 550034
Dichelachne inaequiglumis[a]	Milligan 207	HO 516928		
Dichelachne micrantha			Archer s.n.	NSW 550213

Launceston and did not include grasses (Buchanan 1988b). During the summer of 1837–38, Charlotte Smith roamed the coast near Circular Head and made collections of *Gunn 596 Poa labillardierei* Steud. on 19.xii.1837 and *Gunn 988 Dichelachne crinita*, *Gunn 991 Deyeuxia quadriseta*, *Gunn 1007 Lachnagrostis billardierei* and *Gunn 1012 P. labillardierei* on 8.i.1838. Other grass collections from Circular Head, bearing Gunn's numbers, may also have been made by her (e.g. *Gunn 991 D. quadriseta* on 25.xii.1837 and 12.i.1838). Gunn was particularly indebted to Charlotte for many marine algae, shell and orchid collections and for her care of his pressed specimens while away on exploration trips (Burns & Skemp 1961). Sadly, she died on 6.x.1838 at the age of 29 (The Cornwall Chronicle 1838).

Based on either her labelled initials or her known collecting dates, Mary Ballantine made almost 20 grass collections for, or with, Gunn. These include *Gunn 1008 Agrostis venusta*, *Gunn 1446 Lachnagrostis semibarbata* (Trin) A.J.Br., *Gunn 996 Austrostipa semibarbata* (R.Br.) S.W.L.Jacobs & J.Everett, *Gunn 596 Poa rodwayi* Vickery/*P. sieberiana* Spreng., *Gunn 998 Rytidosperma pilosum* (R.Br.) Connor & Edgar/*R. caespitosum* (Gaudich.) Connor & Edgar and *Gunn 992 Vulpia bromoides* (L.) Gray on 15.xi.1840, *Gunn 1008 Agrostis venusta* and *Gunn 588 Austrostipa pubinodis* on the 18.xi.1840, *Gunn 592 L. aemula/L. filiformis*, *Gunn 1446 L. semibarbata* and *Gunn 596 P. rodwayi/P. tenera* F.Muell. ex Hook.f. on 11.xii.1840 and *Gunn 592 L. aemula*, *Gunn 1469 P. hookeri* Vickery and *Gunn 586 Koeleria macrantha* (Ledeb.) Schult. on 19.xi.1842. Mary, the daughter of Duncan Ballantine Esq. of Kenmore, was married by Rev. Dr John Lillie to J. Smith of Hobart on 2.i.1849 (Hobart Courier 1849).

John Lillie, who had also officiated at the second marriage of Ronald Gunn in 1839, to Margaret Jamieson

Table 1. *Continued*

Taxon	Joseph Milligan (1807–1884)		William Archer (1820–1874)	
	Coll. No.	**Herb. Cat. No.**	**Coll. No.**	**Herb. Cat. No.**
Dichelachne rara			Archer 32 Archer s.n.	HO 102815 HO 516916
Echinopogon ovatus	Milligan 213	HO 128572	Archer s.n.	HO 515904
Lachnagrostis aemula	Milligan 202 Milligan 1301 Milligan 202	HO 128187[c] HO 128190[d] NSW 13517	Archer s.n.	NSW 13508
Lachnagrostis billardierei			Archer 5	NSW 548634
Lachnagrostis filiformis	Milligan s.n.	HO 515710	Archer s.n.	HO 93164
Lachnagrostis morrisii[b]			Archer s.n.	HO 93163
Lachnagrostis rudis			Archer s.n.	NSW 546291
Lachnagrostis semibarbata			Archer s.n. Archer s.n.	NSW 13362 HO 101640
Pentapogon quadrifidus	Milligan 201 Milligan 201	HO 515029 NSW 550585[e]	Archer s.n. Archer 38 Archer s.n. Archer 27 Archer 39 Archer 40	HO 515165 HO 515167 NSW 504072 NSW 550576(a) NSW 550576(b) NSW 550584
Polypogon monspeliensis			Archer s.n. Archer 59 Archer s.n.	HO 515899 NSW 548019 NSW 548024

[a] *D. inaequiglumis* (Hack. ex Cheeseman) Edgar & Connor; [b] *L. morrisii* A.J.Br.; [c] Hampshire/Surrey Hills, *ca.* 1840; [d] Macquarie Harbour, 1.v.1842; [e] W.H. Archer label but collection number suggests Milligan.

Figure 2. CGE 34010 ex Herb. John Lindley: an amalgamation of different collections, determined by Joyce Vickery in 1938. **a**. *Lachnagrostis aemula* from Tasmania by George Everett Esq. with a label determination by Nees von Esenbeck; **b**. faint pencil determination by Munro, presumably referring to Everett's collection; **c**. *L. aemula* from Tasmania by Ronald Gunn with a label determination by Munro; **d**. *L. drummondiana* from Western Australia by Georgiana Molloy with a label determination by Munro; **e**. purchase label post Lindley's death. Image kindly provided by the Herbarium of the University of Cambridge.

of 'Glen Leith' near Norfolk (Launceston Advertiser 1839), was another keen botanist, a founding member of the Tasmanian Society and accompanied Gunn on collecting trips around Hobart (Buchanan 1988b). Surprisingly, only one collection by Lillie (*Cryptandra exilis* D.I.Morris HO23457) appears on the Australasian Virtual Herbarium (AVH 2021). However, it is likely that most of his collections were incorporated into Gunn's, as his initials appear on a number of labels (Buchanan 1988b). Somewhat confusingly, Gunn's servant, James Lee, an assigned convict and employed primarily as a bird-skinner, has the same initials. Lillie was appointed Honorary Secretary of the Royal Society of Tasmania from 1845–1848.

George Everett Esq.: Another name associated with some Gunn collection sheets is that of George Everett Esq. of Clapham, an elected Fellow of the Linnean Society of London on 2 April 1839 (Linnean Soc. 1849). In the preceding year, Everett had presented to the Zoological Society of London, a "series" of marsupial skins brought from Van Diemen's Land (Bell 1838). Several of Gunn's grass collection sheets at CGE and K (App. 1B) also have an Everett label (Fig. 2a) attached to, or note associated with, a fragmentary specimen (invariably dated 1838) and agree with Gunn's notes in his catalogue (Gunn *ca.* 1830–1850). Everett's collections appear to be largely focused on Mt Wellington near Hobart and it is possible that he passed them on to Gunn when the latter visited Hobart in April 1838 (Buchanan 1988b), which was the same month the '1837' consignment was sent to Hooker. As George Everett is listed as a local subscriber to the University College Album (Uni. Students 1830), he was probably educated at Glasgow University, where William Hooker was the current Regius Professor of Botany. Everett could have made Gunn's acquaintance, on William's prompting, and collected with him or for him. Surprisingly, none of the correspondence between Gunn and Hooker mentions him. The majority of Everett's collections appear to have been sent directly to, or forwarded on to, John Lindley and, consequently, are now at CGE. Although Everett was married on the Island of Jersey in 1842 (Urban 1842) and in January of the following year was back in Tasmania as a medical attendant at New Norfolk (Hobart Courier 1843), a Coroner of the Colony (Hobart Courier 1844) and a Surgeon at Port Arthur (Hobart Courier 1845), there is no evidence to suggest that he continued in his botanical pursuits. Interestingly, Gunn was not elected a fellow of the Linnean Society until 1850, some 11 years after Everett, despite his far more extensive collections: perhaps as much the result of the difference between an English gentleman, and a Colonial Government employee, as not being able to be present in London when the Society met to vote on new candidates.

Joseph Hooker and Charles Stuart: Although Gunn botanised with Joseph Hooker in 1840, during the brief period when Joseph was in Hobart, and collections from the two men often appear on the same sheets at K, no joint grass collections appear to have been made. Only one grass collection from Tasmania by Hooker (*1186 Deyeuxia frigida*: K 000342410) for this period (November 1840) could be found (App. 1C) with the possibility of another (*433 Lachnagrostis filiformis* (E 00680885), as the writing on the two sets of labels is similar. A further collection of *Dichelachne crinita*: K 0009134030(a) has no label but has *'V. D Land JDH'* written on the sheet by his father and is mounted with specimens from Sieber and Labillardière. As Hooker did not number his collections (Goyder *et al.* 2012), the numbers associated with his labels were probably added at a later stage.

Charles Stuart was a nurseryman at Launceston, who made plant collections for Gunn from about 1842 to 1847 but had a serious falling out with him in 1849, complaining to Ferdinand von Mueller on 8 June: "... respecting the specimens I left with Mr. Gunn he has in a most unhandsome manner made away with them and made a paltry excuse saying that he thought I should not want them, but it is just his character, but after the numbers of specimens I have given him & information he has got from me I should not have thought him so bad, but the fact is he is jealous of any persons knowledge of plants lest it should discover his defects, of which he has plenty, but I have no more connection with him. I know not if you have had any communication with him, but if so you will find him profuse of offers & promises, but take my word for it you will never get any thing more, but of this you will be a judge should you ever see or write to him, but I have said enough about him, and so in order that I would not cause any disappointment I have forwarded you I think in the 2 Boxes near 600 genera & sp. many of which were not in his possession, & of which you will find duplicates & triplicates, so that after all it is

perhaps better as it is, as those specimens with him were small, these are all I can promise you this season but I hope to resume the next ...." (Home *et al.* 1998). Stuart thereafter sent his Tasmanian specimens to Mueller in Adelaide (1849–1852) and in Melbourne (1855–1857) as the Government Botanist for Victoria (Maiden 1909; Buchanan 1988b; Orchard 1999). Mueller relied heavily on Stuart to provide him with coverage of the Tasmanian flora, writing to William Hooker on 21 November 1853: " ... The very desired work of your celebrated son, 'Flora Tasmanica', could, I am inclined to believe, receive ample additions from these sources; for I am convinced that Mr Gunn did not find all the species which Mr Charles Stuart procured for me." (Home *et al.* 1998). Despite this praise for Stuart's work, nine years later when writing to George Bentham, Mueller admitted that had he known Stuart's previous history, even though he always "acted energetically and disinterestedly for me", he would not have used his name in full (but only as C. St.) when quoting his contributions in correspondence and publications: a strong suggestion that Stuart was an ex-convict (Home *et al.* 2002).

There are 166 Tasmanian grass sheets attributed to Stuart at MEL (AVH 2021). As Stuart had his own collection numbering system, it is difficult to identify the earlier specimens forwarded to (or purloined by) Gunn. In a letter to Mueller on 8 January 1849, six months before his quarrel with Gunn, Stuart indicates that he, in turn, received specimens from him: "...I am most anxious to show you the plants of VDL, as it is, you will most likely find some of these interesting & very likely overlooked hitherto – of those to which I have prefixed names I beg to say that you must not take them for granted as I have received them from Gunn & others, and cannot vouch for their being correct..." (Home *et al.* 1998). Two '*Stuart*' collections among the grasses at HO were found in the current study, which have Gunn nos.: *Gunn 1476 Pentapogon quadrifidus* (HO 515168) and *Gunn 596 Poa labillardierei* (HO 98962). A collection (*Dichelachne sieberiana* US 733706), sent from MEL, as *D. sciurea*, Southport, J.D. Hooker, but with a notation of '*Gunn 989?*', is likely to also be a Stuart collection, gathered from his sojourn in Southport during 1855–1857. At least 45% of his grass collections at MEL (and 25% of all his Tasmanian collections) were gathered from Southport, whereas there are only two Gunn collections (*Leptecophylla abietina* (Labill.) C.M.Weiller and *Shizaea fistulosa* Labill.), dated December 1838, from the same region. Unfortunately, many of Stuart's collections lack a collection date and/or location (e.g. 19% of his grass collections lack a location). None of Stuart's Agrostid grass collections at MEL can be identified as being originally collected by or for Gunn.

Collections and numbers

The Agrostid grass collections from 1837 to 1849 (Table 2) follow Gunn's collecting itinerary (Buchanan 1988b; Lander 1988), except for one anomaly. Gunn was supposedly collecting from Marlborough to the Lake St. Clair region of the Derwent Valley during the 4–9 January 1841 and a review of his collections (KHC 2021; AVH 2021) show about 40 Gunn samples from Marlborough on either side of the 7 January with at least another 40 from Lake St Clair on that day. However, also on the 7 January 1841, 24 Gunn collections, including *Agrostis*, *Lachnagrostis* and *Deyeuxia* (Table 2) were made from the base or summit of Mt Wellington. While all the labels on these collections have Gunn's writing, Gunn could not have been in two places at once, so either the Mt Wellington dates are incorrect or one of Gunn's assistants made these collections. Gunn's itinerary (Buchanan 1988b) shows that the Rev John Lillie made a collecting trip with Gunn to Mt Wellington in late January 1841, so it is possible that Lillie also made the early January collections by himself, on Gunn's behalf. The trip to Lake St. Clair was likely inspired by Hooker's trip up the Derwent Valley some months earlier, with the assistance of one of Gunn's collectors (Buchanan 1988b). During Hooker's early spring foray, much of the flora was unlikely to be in full flower, so a mid-summer trip should have yielded better results.

The taxa, *Agrostis parviflora*, *Deyeuxia gunniana*, *Lachnagrostis filiformis*, *L. rudis* and *Pentapogon quadrifidus* were not sent to Hooker until the 1837 consignment and *D. gunniana* and *L. rudis* were only ever sent the once. The lack of *L. filiformis* collections in the earlier consignments and its limited collections (two only) in the 1837 consignment is surprising, given its ubiquitous distribution. Taxa not sent to Hooker until 1846 included, *Deyeuxia frigida*, *D. monticola*, *D. scaberula*, *Dichelachne sieberiana* and the exotic *Polypogon monspeliensis*.

Table 2. Ronald Gunn's and Robert Lawrence's collections of *Agrostis*, *Lachnagrostis*, *Deyeuxia*, *Echinopogon*, *Dichelachne*, *Pentapogon* and *Polypogon* in order of collection date.

Date	Location	Collections
1832–1836	Tasmania	*587 Deyeuxia quadriseta, 589 Dichelachne crinita, 590 Echinopogon ovatus, 592 Lachnagrostis aemula, 593 Agrostis venusta, 771 Deyeuxia quadriseta* [renumbering of *Lawrence 57* collected 1832]
11.i.1837	Wet (Neck) Marsh [Circular Head]	*988 Dichelachne crinita, 989 Pentapogon quadrifidus* var. *parviflorus, 991 Deyeuxia quadriseta*
[8].ii.1837	Emu River, Hampshire Hills	*1011 Agrostis parviflora* & *Deyeuxia gunniana*
xii [1837]	Circular Head	*590 Echinopogon ovatus*
2.xii.1837	[Circular Head]	*1008 Agrostis venusta*
11.xii.1837	[Circular Head]	*1006 Lachnagrostis aemula*
25.xii.1837	[Circular Head]	*990* & *991 Deyeuxia quadriseta*
2.i.1838	Back Lagoon, near Circular Head	*989 Dichelachne rara, D. crinita* & *Pentapogon quadrifidus*
8.i.1838	Sand Neck, Circular Head	*988 Dichelachne crinita, 991 Deyeuxia quadriseta, 1007 Lachnagrostis billardierei*
12.i.1838	Circular Head	*991 Deyeuxia quadriseta*
18.i.1838	Doctors Boat Shed, Circular Head	*1005 Lachnagrostis rudis*
xii.1838	Recherche Bay	*989 Dichelachne rara*
1.iii.1839	Mt Wellington Base of Mt Wellington	*1449 Agrostis parviflora* *1462 Deyeuxia rodwayi, 1479 D. monticola, 1447 Lachnagrostis filiformis*
[26].xii.1839	New Norfolk	*1447 Lachnagrostis filiformis*
28.xii.1839	Glen Leith	*989 Dichelachne sieberiana*
31.i.1840	Mt Wellington	*1471 Agrostis parviflora* & *Deyeuxia innominata, 1479 Deyeuxia monticola*
xi.1840	New Norfolk	*1447 Lachnagrostis filiformis*
5.xi.1840	New Norfolk	*1477 Pentapogon quadrifidus*
15.xi.1840	New Norfolk	*1008 Agrostis venusta, 1446 Lachnagrostis semibarbata*
18.xi.1840	New Norfolk	*1008 Agrostis venusta*
25.xi.1840	New Norfolk	*1008 Agrostis venusta*
11.xii.1840	New Norfolk	*592 Lachnagrostis aemula* & *L. filiformis, 1446* (orig. *592*) *L. aemula* & *L. semibarbata*
14.xii.1840	Hobart	*989 Dichelachne crinita, 998 D. sieberiana, 991 Deyeuxia quadriseta*
28.xii.1840	Glen Leith	*s.n. Agrostis venusta*
7.i.1841	Base of Mt Wellington	*1447 Lachnagrostis filiformis* & *D. quadriseta, 1448 Agrostis parviflora* & *A. venusta, 1489 Deyeuxia quadriseta, 1462 D. scaberula*
8.i.1841	Marlborough	*1489 Deyeuxia quadriseta*
29.i.1841	Mt Wellington	*1462 Deyeuxia rodwayi*
29.x.1841	Formosa	*1477 Pentapogon quadrifidus*
13.xi.1841	Penquite	*991 Deyeuxia quadriseta, 1478 Pentapogon quadrifidus*
30.x.[1842]	Epping Forest	*1008 Agrostis venusta*
19.xi.1842	Macquarie Plains	*592 Lachnagrostis aemula*
7.xii.1842	Formosa	*1447 Lachnagrostis filiformis, L. aemula, Pentapogon quadrifidus* & *Dichelachne crinita*

Table 2. ***Continued***

Date	Location	Collections
1842	Tasmania	*1476 Pentapogon quadrifidus*
10.i.1843	Sandy plains, George Town	*991 Deyeuxia quadriseta*
18.ii.1843	Arthur's Lake	*1450 Lachnagrostis* 'Arthurs Lake'
1.xii.1844	Penquite	*989 Dichelachne rara, 989 Pentapogon quadrifidus, 991 Deyeuxia quadriseta, 1478 Pentapogon quadrifidus*
9.xii.1844	Penquite	*592 Lachnagrostis aemula, 592/1 L. semibarbata, 991 Deyeuxia quadriseta*
16.xii.1844	Penquite	*1478 Dichelachne sieberiana*
17.xii.1844	Cataract, South Esk River, Launceston	*590 Echinopogon ovatus, 1447 Lachnagrostis filiformis*
21.xii.1844	Launceston marsh	*1460 Polypogon monspeliensis*
16.i.1845	Side of the Western Mountains	*592 Lachnagrostis aemula, 1448 Agrostis parviflora*
17.i.1845	towards Arthurs Lakes Arthurs Lakes	*1462 Deyeuxia frigida 1471 Agrostis parviflora*
1.iv.1845	St Patricks River	*1461 Deyeuxia frigida & D. scaberula*
[7].xii.1845	Penquite	*989 Dichelachne sieberiana*
15.i.1846	North Huon River	*s.n. Deyeuxia scaberula*
29.i.1849	Mt Wellington	1449 *Deyeuxia rodwayi*

Although Hooker (1858) used *Agrostis sciurea* R.Br. for Gunn's collections of *D. sieberiana*, Brown's type is identified as *Dichelachne micrantha* (Veldkamp 1975). Despite its widespread occurrence in Tasmania, *D. micrantha* has not been positively identified in any of Gunn's collections. However, collections of the taxon were made by Charles Stuart during 1855–1857 from Southport (e.g. MEL 2130980A and MEL 2130992A). On occasion, *D. rara* was gathered with *D. sieberiana* or *D. crinita* in Gunn's collections but they were usually not recognised as separate taxa.

As previously noted, Gunn's collection numbers defined taxa rather than individual population collections. Among the Agrostid grasses, there was obviously some deliberation as to whether a new collection represented a new taxon or not, as many species were given various collecting numbers throughout the collecting years (Table 3). The collection numbers themselves, probably in Gunn's hand, are often in a larger font and darker ink than the location and date information, suggesting they were added at some later time back at Gunn's home, after he had had a chance to compare them to his reference herbarium. As with most of his early plant collections, he preferred not to place names on his grass labels, leaving it to Hooker to do so and provide the names back to him for further reference (Burns & Skemp 1961). As Hooker's determinations and replies to Gunn were likely to take a considerable length of time, it is not surprising that many grass taxa received a variety of collection numbers. In his catalogue, Gunn (*ca.* 1830–1850) frequently noted the names of grass taxa provided by Nees von Esenbeck (1843) in his London Journal of Botany paper, as well as Labillardière (1805) and Brown (1810) names. Copies of these publications were presumably sent to him by Hooker. By the time Nees von Esenbeck's names were available, a sizeable proportion of Gunn's collections had already been made.

The inflorescence maturity and phenotypic plasticity of grasses associated with environmental influences may have generated new numbers for any grass population that looked a little different to preceding collections. A particular example is *Deyeuxia quadriseta*, for which Vickery (1940) described eight forms (apart from one formal variety), of which seven were cited for Tasmania. Gunn applied four different numbers to the collections he made of this taxon (Table 3). In a couple of instances, Gunn used an earlier collection number

followed by '?', indicating that he was unsure if the new collection was the same as the previous or not. Examples of these are *989* for *Dichelachne crinita/D. rara* 2.i.1838 (K 000356725/K 000342389) compared to *989?* for *D. sieberiana* xii.1845 (K 000342388) and *991* for *Deyeuxia quadriseta* 11.i.1837 (K 000342403) compared to *991?* for *D. monticola* 14.xii.1840 (K 000342415).

A few of Gunn's grass collections contained mixed genera and all received the same collection number (e.g. *1447* collected from the Formosa marshes on 7.xii.1842 contained *Lachnagrostis aemula*, *L. filiformis*, *Dichelachne crinita* and *Pentapogon quadrifidus*). Occasionally Gunn used the same collection number for different taxa collected from different sites (e.g. *1447* for *Deyeuxia quadriseta* and *L. filiformis* from the base of Mt Wellington on 7.1.1841 and for *L. aemula* etc. from Formosa as above). This appears to have been due to 'contaminants' collected with the target taxon and not separated out until done so by Hooker or Bentham at K or by Vickery at NSW. In addition, particularly among the *Deyeuxia* and *Dichelachne*, collections made by Gunn are only relatively recently recognised as consisting of more than one species (e.g. *1462* applied to *Deyeuxia scaberula*, *D. frigida* and *D. rodwayi*).

Duplicate distributions

Ronald Gunn was first and foremost, a collector for William Hooker and later for his son, Joseph. Nevertheless, he did send considerable numbers of duplicate specimens to John Lindley (1799–1865), Professor of Botany at University College, London, and Robert Brown at the British Museum and on at least one occasion each, each man received a primary set of specimens (Cave 2012). Although his collections were much sought after, Gunn was reluctant to broaden his direct distribution of specimens to others, regardless of their standing in botanical circles. For example, George Bentham (a gentleman botanist of independent means, secretary of the Horticultural Society of London, member of the Linnean Society and author of *Flora Australiensis* (Bentham 1878)), was keen to receive specimens from Gunn, as early as 1834, but even with Lindley's support, Gunn politely refused to do so, as his time and material resources were already severely stretched (Cave 2012).

As some compensation to not broadening his recipient base, Gunn did encourage Hooker, Lindley and Brown to draw duplicates from his collections to share among themselves and to pass on to others, such as Bentham. A review of labels associated with sheets from George Bentham's herbarium shows that he received duplicates of Gunn's collections (not just grasses) from John Lindley in 1835 and 1838 and from William Hooker in 1838 and 1844. Nevertheless, Gunn was frustrated to find that his primary recipients were extremely competitive to gain the best of his collections for themselves. As he complained to Lindley in 1843, "If you good Botanists at Home would only trust One another, I could rather send all to one person, & divide as you liked, as it would save me a vast deal of time & labour which I can ill spare ..." (Cave 2012).

Most of Gunn's grass collections reached William Hooker while he was still at Glasgow. When Hooker moved to Kew, his herbarium, in its entirety, went with him (Henry Noltie 2017, pers. comm., 15 November). The only grass consignment of Gunn's that was sent directly to Kew was in 1846.

Eventually, Gunn's prodigious collections became too much for Hooker to handle with ease. In October 1844, he wrote to Gunn "you have collated so ably & well that there cannot be a large amount of Phaenogamic plants yet to be discovered, & we have as many duplicates of most as we know what to do with ... We are now so overpowered with duplicates & have so little time to distribute them, that I would earnestly request you to attend more to the quality than quantity of the specimens." (Endersby 2001).

A major difference in outlook between the two men was, that while Gunn was attempting to uncover the breadth of variation in a 'species' across geographical and environmental ranges, Hooker's interests lay in 'lumping' collections together into as few species as possible (Endersby 2001; Cave 2012). As a consequence, it is possible (though no direct evidence is currently forthcoming) that Hooker may have discarded some of Gunn's offerings, or at least stockpiled them, aside from his reference collection.

Gunn collections at K: Gunn Agrostid grasses found at K number 46 sheets, representing 57 collections (App. 1): *Agrostis parviflora* (4 sheets, 6 collections); *A. venusta* (4 sheets, 6 collections); *Deyeuxia gunniana* (1 sheet (fragment only), 1 collection); *D. monticola* (3 sheets, 4 collections); *D. quadriseta* (6 sheets, 8 collections);

Table 3. Ronald Gunn's taxon numbers, names and comments for his Agrostid grass collections.

Taxon	Collection Numbers[1]	Catalogue Determinations	Catalogue Comments[2]
Agrostis parviflora	*1011* *1448, 1449, 1471*	*Agrostis intricata* Nees	"H. Hills Emu Riv. Mixed with *Echinopogon Gunnianus* very like 1008 1837"; "Hampshire Hills Feb. sent home with 1011 - This is very like 1005 I have no doubt"
A. venusta	*593* *1008* (*1448*)	*Lachnagrostis willdenowii* Trin.	"*Lachnagrostis Willdenowii* ?" "CH^{d}. log fence, lagoon 1837"; "probably 593"
Deyeuxia frigida	*1461, 1462*		
D. gunniana	*1011*	*Echinopogon gunnianus* Nees	"*Gunnianus* H.Hills Feb. 1837"; "Sent with *Agrostis intricata*"; "not know this"
D. innominata	*1471*		
D. monticola	*991* *1479*	*B. lobatum* Nees; *A. lobata* R.Br.	see *Deyeuxia quadriseta*
D. quadriseta	*771* (*587*) *990, 991* *1447, 1479, 1489*	*Bromidium quadrisetum* (Labill.) Nees; *Agrostis quadriseta* (Labill.) R.Br. *B. lobatum* Nees; *A. lobata* R.Br.	"from RWL's Herb. 57 1836"; "Everett", "Lab. t.32" "like *Hierochloe*" "tall loct place side of Neck Circular H^{d}. 1837"" "very large wet places, Neck CH^{d}"; "4 vars of this described, differs from *Agrostis quadriseta* in the teeth of the valves being short" [*990 & 991* treated as two vars.]
D. rodwayi	*1462, 1479*		
D. scaberula	*1461, 1462*		
Dichelachne crinita	*589* *988*, (*989*) *1447*	*Muhlenbergia crinita* (L.f.) Trin.; *Anthoxanthum crinitum* L.f. *M. mollicoma* Nees	"rel *crinita* 1835""X *Muhlenbergia crinita* V.D.L. Everett - I suppose *Ag. crinitum* Labill. t.263" "Neck Rocky C. CH^{d}. 1837"; "like *M. crinita* but easily known by the soft arista - which are nudato flexis"
D. rara	*989*	*Muhlenbergia rara* (R.Br.) Trin.	"Back Lagoon CH^{d}. 1837 mixed with *Pentapogon Billardieri*"; "part of 989 *Muhlenbergia rara* R.Br. ß var. *macrostachya* Everett"
D. sieberiana	*989* (*998*) *1478*	*Muhlenbergia rara* (R.Br.) Trin.	see *Dichelachne rara* "*Danthonia* Rocky C."; "*Danthonia semiannularis* Br. 129"; "Labill. t.33"
Echinopogon ovatus	*590*	*Echinopogon ovatus* (G.Forst.) P.Beauv.; *Agrostis ovata* G.Forst.	"CH^{d}. bottle brush 1835.7"; "Lab. t.21"
Lachnagrostis aemula	*592* *1006*, (*1007*) *1446, 1447*	*Lachnagrostis aemula* (R.Br.) Trin.	"*Billardieri* ?" "CH^{d}. back of lagoon 1837"; "like 592"; "same size as 1007 but the flowers are hairy"; "probably same as 592"
L. billardierei	*1007*	*L. billardierei* (R.Br.) Trin.; *Avena filiformis* G.Forst.	"CH^{d}. land neck 1837"; "Lab. t.31"

Table 3. ***Continued***

Taxon	Collection Numbers[1]	Catalogue Determinations	Catalogue Comments[2]
L. filiformis	*592*, (*1007*), (*1008*) *1447*	*Lachnagrostis aemula* (R.Br.) Trin.	see *Lachnagrostis aemula*
L. rudis	*1005*	*Agrostis aequata* Nees	"CH[d]. Richardson's Boatshed 1837"
L. semibarbata	*592/1* *1446*	*Lachnagrostis aemula* (R.Br.) Trin.	see *Lachnagrostis aemula*
L. 'Arthurs Lake'	*1450*		
Pentapogon quadrifidus	*989*	*Pentapogon billardierei* R.Br.; *Agrostis quadrifida* Labill.	"mixed with *Muhlenbergia rara*" "To alter this number"; "Lab. t.22"
	(*1447*), *1476*, *1477*, *1478*		
Polypogon monspeliensis	*1460*		

[1] ( ) = unintentional collection or contaminant; [2] Gunn's Catalogue only records his grass collections to No. *1012*, CH[d.] = Circular Head, "Lab." = Labillardiere (1805) taxon numbers.

D. scaberula (3 sheets, 4 collections); *Dichelachne crinita* (4 sheets, 4 collections); *D. sieberiana* (2 sheets, 2 collections); *Echinopogon ovatus* (2 sheets, 2 collections); *Lachnagrostis aemula* (3 sheets, 3 collections); *L. billardierei* (3 sheets, 3 collections); *L. filiformis* (5 sheets, 7 collections); *L. rudis* (1 sheet, 1 collection); *L. semibarbata* (2 sheets, 2 collections); *Pentapogon quadrifidus* (2 sheets, 3 collections); *Polypogon monspeliensis* (1 sheet, 1 collection). A few sheets have mixed taxon collections. The majority of sheets derive from Gunn's 1846 consignment, with about a dozen from the 1837 consignment and only five from earlier 1830s collections.

All the individual collections on each sheet have 'Herbarium Hookerianum 1867' stamps except for three ex Lindley sheets with 'Herbarium Benthamianum 1854' stamps, four ex Munro sheets (received by K in 1880) and one Gunn collection which was separated from a Lawrence collection, post 1938.

The 1837 and 1846 consignment sheets include Gunn's hand-written labels with collection numbers, locations and dates in ink. These labels are often duplicates of those accompanying duplicate material at HO and NSW. Only the 1837 consignment labels at K have inked determinations, made by J.D. Hooker, using Nees von Esenbeck's nomenclature, and therefore written after the publication of *Gramina Novae Hollandia* (Nees von Esenbeck 1843) but probably before the arrival of Gunn's 1846 consignment in April 1847 (Burns & Skemp 1961). In November 1847, Joseph Hooker departed for a three-year expedition to India and the Himalayas (Curtis 1972) and his preparations for such would have drawn his attention away from the recent plant arrivals from Tasmania. Among the 1837 Hooker annotated labels is one of *Echinopogon ovatus: Lawrence 250* (K 000342400), collected in 1833 but on the same sheet as *E. ovatus: Gunn 590* (K 000342401), collected in December 1837 (the consignment number being on the label). Given Hooker's annotation on both labels, it appears that the earlier Lawrence and later Gunn collections were mounted together after the arrival of the 1837 consignment.

All but five labels are marked 'Tasmania Gunn' in ink by the same but unknown hand, likely at the behest of William Hooker after he received the 1846 consignment. After his return from India and in preparation for his Floras of the *'Erebus'* and *'Terror'* Expedition, Joseph Hooker applied the determinations he employed for *Flora Novae-Zealandiae* (Hooker 1853) to most of Gunn's specimen sheets, These included *Agrostis* (Brown 1810) for *Agrostis* and *Deyeuxia* taxa and *Deyeuxia* (Kunth 1829) for *Lachnagrostis* taxa. Occasionally, Gunn's labels, but more commonly the sheets themselves, are marked with George Bentham's written determinations in ink, which are usually underlain by reference information to *Flora Australiensis* (Bentham 1878) in a different and

probable later hand. In addition, the labels and sheets have a variety of other determinations or morphological notes, in either ink or pencil, and written by Hooker or Bentham or in an unknown hand. Earlier determinations are often crossed out when replaced with later determinations.

The 'Hook 1837' acquisition at W: The earliest clearly identified subsampling of Gunn's grass consignments to Hooker was a set of duplicates which Hooker sent to Vienna in 1837 from Glasgow, along with almost 2,000 other specimens of non-grass taxa. These duplicates, now at W, can be identified by a label bearing a Gunn taxon number, the abbreviation 'V.D.L^{d}' for Van Diemen's Land and 'Hook' over '837' (App. 1A, Fig. 3): not to be confused with Gunn's 1837 consignment to Hooker. The Acquisition Catalogue at W lists the grasses in this set as those relating to Gunn's early collections (i.e. his 1833 consignment: *417*, *418* and his 1835 consignment: *584*, *585*, *586*, *587*, *588*, *589*, *590*, *591*, *592*, *593*, *594*, *595*, *596* and *597*), but also includes Lawrence's collections from the early 1830s (i.e. *55*, *57*, *58*, *59*, *60*, *61*, *249*, *250*, *251* and *271*). None of Gunn's newer collection numbers from his later consignments to Hooker (i.e. 1836: *770* and *771* and 1837: *986–1012*) are included in this acquisition. Gunn's 1836 consignment was not sent until November of that year, at the earliest, and may not have arrived in Glasgow until the middle of 1837 (Burns & Skemp 1961). Gunn's '1837' consignment was not sent until May 1838. As a few specimens of the 'Hook 1837' acquisition can be identified with material in the Trinius Herbarium at LE, it is probable that they helped form the basis of *Agrostidea* (Trinius 1841). One hundred years later, on the brink of WWII, these LE TRIN duplicates were examined at Kew Gardens by J. Vickery of NSW in 1938 and C.E. Hubbard of K in 1939, and similarities noted to the early Gunn collections derived from Hooker's herbarium.

The John Lindley duplicates: As noted above, John Lindley received, directly from Gunn, duplicates of his collections forwarded to Hooker. In addition, Hooker forwarded some Gunn material to Lindley. Apart from his orchid collections which went to Kew, Lindley's large herbarium was acquired by Cambridge University, soon after his death (Fig. 2e). However, Lindley herbarium sheets are also scattered throughout the collections of other European herbaria with whom Lindley exchanged material during his lifetime.

Although Gunn sent Lindley many duplicates of his early consignments to Hooker, he became increasingly annoyed at the lack of response. He complained to Hooker on 30 March 1835: "I have not yet received a single letter or acknowledgement from Dr. Lindley – I have therefore sent him my third and last box of specimens – merely containing duplicates of my former collections to render those already received as complete as possible – but I have not sent him a single new No. after 443 – As I cannot but feel hurt that years should elapse without his finding time to say "thank you".....". Five Gunn grass sheets from Lindley's herbarium and now at CGE, contain written labels in ink with the taxon numbers *588* (*Austrostipa mollis*), *589* (*Dichelachne crinita*), *590* (*Echinopogon ovatus*), *592* (*Lachnagrostis aemula*) and *593* (*Agrostis venusta*) written in a large font. Most of these labels also include 'V. D. Land Gunn' (Fig. 2c). The determinations on these labels are by William Munro, who presumably examined them on his return in mid-1847 from Military service in India and before his deployment to Gibraltar and the Crimea in 1853–1854 (Archer 2017). These collections probably represent part of Gunn's 1835 consignment sent initially to Hooker and forwarded by him to Lindley, as Gunn writes to Hooker on 16 November 1836, "Having broken the chain of my Nos. to Lindley by not forwarding him any new Nos. in 1835 – I do not think I shall again resume my correspondence with him – I have therefore sent you off my collections for the two last seasons, and shall leave it to you to give such portion to Dr Lindley, or any other Botanist as you can spare and as you can get a fair equivalent for …" (Burns & Skemp 1961).

Despite Gunn's resolve to not engage with Lindley again, he did send future plant consignments to him as he wrote to Hooker on 21 April 1838: "I have resumed my correspondence with Dr. Lindley – it has most materially added to my labour in dividing the specimens so that each might have a fair share in about the same state of flower and fruit, &c. & was no small cause of my delay in completing my boxes. – I wished to have continued sending to you alone leaving to you to distribute, but Dr. Lindley's letter to me was couched in such a style as to admit of no excuse for my further neglect – and indeed strange as is may appear in one who usually prides himself upon being a punctual Correspondent, I actually left Lindley's letters unanswered for two years!!!!".

Figure 3. W 0026799: an amalgamation of specimens sent by William Hooker to Vienna in 1837. **a**. *Deyeuxia quadriseta*, *Gunn 587*; **b**. *D. quadriseta*, *Lawrence 57*; **c**. Carl Trinius determination [not his signature]; **d**. Naturhistorisches Museum Wein stamp. Image accessed from https://herbarium.univie.ac.at/database/detail.php?ID=187369

Most of Gunn's 1837 consignment sent to Lindley are also now at CGE and include a printed label marked 'Insula Van Diemen' and 'R. Gunn' (see Brown 2019a: Fig. 1). Duplicates of the grasses, along with Western Australian collections from John Drummond and collections made on Major Mitchell's Expeditions of NSW and Victoria during 1831–1836, were examined by Christian Gottfried Daniel Nees von Esenbeck (1776–1858) of Breslau (Wroclaw), Poland. These collections, with what appears to be Nees von Esenbeck's handwritten determinations, formed the basis for *Gramina Novae Hollandiae* (Nees von Esenbeck 1843) and include *Gunn 988* (as *Muhlenbergia mollicoma*), *Gunn 989* (as *M. rara*), *Gunn 990* & *Gunn 991* (as *Bromidium lobatum*), *Gunn 1005* (as *Agrostis aequata*), *Gunn 1006* (as *Lachnagrostis aemula*), *Gunn 1007* (as *L. billardieri*), *Gunn 1008* (as *L. willdenowii*) and *Gunn 1011* (as *Echinopogon gunnianus*) (App. 1B). The sheet containing *Gunn 1008*, has the top left quarter cut away and replaced with a specimen of *L. filiformis* (as *L. willdenowii*) mounted on a separate trimmed card from the Mitchell expedition. What specimen was mounted on the original quarter sheet is unknown. Two additional sheets, *Gunn 989* (as *Pentapogon billardieri*) and *Gunn 1011* (as *A. intricata*) have Nees von Esenbeck labels with determinations for material separated from the main collections. Some fragmentary 1838 Everett collections (as *L. aemula*, *B. lobatum*, *B. quadriseta*, *M. crinita* and *M. rara*), either attached or separate to the Gunn collections, were also examined and determined by Nees von Esenbeck (App. 1B, Fig. 2a).

Nees noted some of Gunn's collections from earlier Tasmanian consignments (*Gunn 337*, *417* and *418* (as *814*) ex 1833; *Gunn 584*, *590*, *591* and *596* ex 1835; *Gunn 770* ex 1836) (Nees von Esenbeck 1843) which indicates that Lindley supplied these to represent taxa not included in the 1837 set. Among these, sheets of *Gunn 337* (*Hierochloe redolens*) and *Gunn 590* (*Echinopogon ovatus*) have currently been identified at CGE with Nees annotations.

Surprisingly, Nees included Gunn's collecting dates in the protologues associated with his newly described taxa (Nees von Esenbeck 1843), although none of the sheets contain these dates. As there is no evidence that he examined any other duplicates of Gunn's collections, it is probable that Lindley either supplied him with the dates independently of the collections or added them later to a draft manuscript. As he did for Hooker, Gunn would have supplied Lindley with his collection dates, even if not written on his labels.

A duplicate of each of *Gunn 1005* and *Gunn 1006* at E of the Gunn 1837 set have Lindley labels but without Nees von Esenbeck's determinations. On the basis of identification of handwriting on the sheets (Henry Noltie 2017, pers. comm., 15 November), these samples, and at least ten other non-grass collections (now at E), were sent to George Arnott Walker-Arnott (1799–1868) of Arlary, Kinross, presumably before Nees examined the bulk of Lindley's grass collections in the late 1830s to early 1840s. Arnott was appointed Professor of Botany at Glasgow University from 1845 and his large herbarium was purchased by the University soon after his death. The Glasgow Herbarium (identified with a 'GL' stamp on each sheet) was sent to Edinburgh in 1965, on permanent loan.

A few grasses, including *Gunn 590 Echinopogon ovatus*, *Gunn 1007 Lachnagrostis billardierei* and *Gunn 1008 L. filiformis* (as *L. willdenowii*) were passed from Lindley to George Bentham. These were labelled in Bentham's hand as 'Lindley 1838', presumably noting the year he received the consignment. Bentham's herbarium was incorporated into K in 1854, just before he started to work from there. At least two Lindley sheets (*Gunn 988 Muhlenbergia mollicoma* and *Gunn 991 Agrostis lobata*), bearing the stamp of 'Herbarium Benthamianum 1854', were sent by Bentham to Eduard Hackel (1850–1926), Professor of Natural History at St. Pölten High School (near Vienna), as *Dichelachne crinita* and *Deyeuxia quadriseta* respectively. As one of these sheets bears the reference for *Flora Australiensis* (Bentham 1878) in the same hand as similar sheets at K, it is apparent that Bentham sent the sheets after his publication. Hackel published the first of many papers on Agrostology in 1871 and became a leading authority on grasses. His collections from Bentham were acquired by W in 1916, along with some 5,400 other grass sheets from his herbarium.

Some additional Gunn Agrostid grass collections from Lindley's herbarium are lodged at W (*Lachnagrostis billardierei*, *L. filiformis*, *Deyeuxia quadriseta*, *Dichelachne crinita* and *Echinopogon ovatus*), labelled 'V.D.L. Lindley 1839', at P (*L. billardierei*, *D. quadriseta*, *D. crinita* and

E. ovatus), labelled 'Herb. Mus. Paris. Van-Diemen. (Gunn – M. Lindley 1839)' and at G (*L. billardierei* and *D. quadriseta*), labelled 'Terre de Van Diemen. Mr. Lindley 1839'. Presumably 1839 was the year the herbaria received the duplicates and all were initially undetermined. For P and G at least, these collections were part of a larger consignment of various plants from Lindley ex Gunn and included many orchid taxa. The grasses at G, sent by Lindley, were originally provided to Pierre Edmond Boissier (1810–1885), a private but avid plant collector throughout Europe, Western Asia and North Africa. The grasses sent to Vienna appear to have been forwarded on loan to Trinius in Saint Petersburg along with those in the 'Hook 1837' acquisition, as most of both sets have determination labels with either Trinius's or Ruprecht's name on them in red ink (the botanists' names likely to have been added later, back in Vienna) (Fig. 3c). Two sheets at P (P 02650873 and P 02650877) ex Gunn via 'Lindley 1839' but without further details, are marked as '*Agrostis montana*'. However, examination of these specimens find them to be *D. quadriseta*, rather than *D. monticola*.

Charles Morgan Lemann (1806–1852), a former student at Trinity College, Cambridge University, bequeathed his herbarium to CGE, on the provisio that the specimens would be named and arranged by George Bentham, which Bentham did from 1853–1861. Five Agrostid grass sheets from Lemann's herbarium have labels bearing the words 'V. Diemen's Land' with four of these (*Lachnagrostis aemula*, *L. rudis*, *Deyeuxia quadriseta* and *Pentapogon quadrifidus*) marked '*a' Lindley 1849*' and the fifth sheet (*L. billardierei*) marked *'ex herb. Lindley'* in an identical hand, which is almost certain to be that of Lemann (Ray Williams 2019, pers. comm., 4 November). Three sheets are compilations of at least two specimens with separate labels. The sheets are part of a larger set of grass specimens ex Lemann's herbarium that also include *Hierochloe*, *Austrostipa*, *Amphibromus* and *Rytidosperma* taxa (at least) from Tasmania plus Drummond grass collections from Western Australia. Only the *L. billardierei* sheet bears Gunn's name, but as it is a mixture of *L. aemula* and *L. billardierei*, it probably represents *Lawrence 7* (see *'St. Petersburg collections'* below). It is probable that all these Lemann herbarium sheets represent duplicates from various Gunn or Lawrence collections, which had been forwarded directly to Lindley or via Hooker to Lindley and received by Lemann in 1849. An additional sheet at Kew (K 000484086, *Dichelachne crinita*) ex 'Herbarium Benthamianum 1854' is again a compilation of specimens of which two have similar labels to those from Lemann's herbarium (one as *Agrostis rara* and one as *A. crinita*), suggesting that Lemann passed this sheet on to Bentham or Bentham kept the sheet for his own herbarium while sorting through Lemann's collections after his death. It is possible that the Lemann herbarium collections without Gunn's name were made by Joseph Milligan and either passed on to Gunn during 1834–1835, collected with Gunn in 1837 or forwarded by Milligan directly to Hooker, who passed them to Lindley during the 1840s. Although many of the sheets have additional specimen labels which bear numbers (from 3 to 28), none can be identified as Gunn's, Lawrence's or Milligan's particular collection numbers for these taxa and neither do they relate to Robert Brown's taxon numbers (Brown 1810). The handwriting on these labels is possibly Lindley's, with the specimens numbered according to an internal reference list.

Two Gunn collections (*Dichelachne sieberiana* and *Echinopogon ovatus*) ex Lindley were found at NY. As the sheets for these collections are stamped 'Herbarium Columbia University New York' and this institution (formerly known as Columbia College) was not named as such until 1896, they could not have been stamped, until after this date. Handwriting on both sheets (one on a specimen label and one the sheet itself), though slightly different, appears to be that of John Torrey (1796–1873), Emeritus Professor of Chemistry and Botany at Columbia College from 1860. Although the sheets do not bear the usual 'Torrey Herbarium' stamp (Amy Weiss 2020, pers. comm., 3 March), a cursory review of Torrey Herbarium sheets on the NY Virtual Herbarium site (NYBG Steere Herbarium 2020) suggests that the stamp was only used for those collections he sold to Columbia College at his Professorial appointment and was not used for collections sent directly to the College Herbarium after that date, even if addressed to Torrey. If the Gunn collections were sent directly from Lindley to Torrey, then they must have been sent between 1860 and Lindley's death in 1865, but it is more likely that they were sent by Lindley to another botanist (possibly Bentham) before eventually finding their way to NY via

Columbia College. Both of the sheets have a 'Critical Notes by B. P. G. Hochreutiner' label dated 1907, and are only two of many others with a similar label (NYBG Steere Herbarium 2020). The Swiss-born, Bénédict Pierre Georges Hochreutiner (1873–1959) became Curator of the Geneva Herbarium in 1906. On the 28 August 1906, he wrote from Geneva to Sir David Prain, Director of Kew Gardens, "Dear Sir, I receive a letter from Mr Britton, New York [Director of New York Botanical Garden], who writes to me that he announced to you my visit in ~~september~~ August, but I doubt that I should be able to arrive in Kew before end of September. But at that time I hope to meet you in your magnificent institut and I will be very thankfull if you allow me to work there for the N.Y. herbarium" (Hochreutiner 1906). It therefore seems that Britton sent Hochreutiner a selection of NY collections for him to take to Kew to match with collections there. Many of his labels are marked 'in Hb. Kew' and contain nomenclatural details. From this study, he published some of his findings (though excluding those relating to the Gunn collections) for NY (Hochreutiner 1910).

Robert Brown duplicates: Despite Gunn's assertion to Joseph Hooker in 1843 that "I send nearly equal quantities to Brown & Lindley ..." (Cave 2012), only 746 Gunn collections appear on the BM database (NHM (BM) 2018) and only two of these are of grasses (i.e. 0.3%), while K records 1585 Gunn collections, of which 105 are of grasses (i.e. 6.6%) (KHC 2021). Gunn only added Robert Brown to his list of collection recipients in early 1840, at the request of the Tasmanian Governor, Sir John Franklin (Burns & Skemp 1966). Even so, Brown appears to have been mainly interested in filling the gaps in his already vast knowledge of the Tasmanian flora and made short, terse requests of Gunn for specimens he wanted (Cave 2012). Whether he discarded unwanted material sent to him by Gunn is unknown but there is little evidence of him having passed Gunn collections on to others. In terms of grasses, his *Prodromus* (Brown 1810) had already described (many based on his own collections), most of the species that Gunn was to later collect. What Brown demanded most from Gunn, was fossilised specimens, sponges, seaweeds and ferns, but also like Lindley, was keen to be the first recipient of Gunn's entire collecting efforts, in order to pick the best out for himself with little regard to the needs and wants of his fellow botanists (Cave 2012).

Saint Petersburg collections: From the 1820s, the German born Carl Bernhard von Trinius (1778–1844) acted as imperial physician to the Russian court, dealt with botanical matters at the Academy of Sciences, taught natural sciences to the future Czar Alexander II and was a member of the Linnean Society (Jardine *et al.* 1845). During 1836–38, he travelled to several cities (Berlin, Leipzig, Halle, Göttingen, Dresden, Prague, Vienna, Breslau, Stuttgart and Munich) of the German Confederation and examined the botanical collections held at their universities before heading back home in May 1838 (Stieda 1894; NHM (BM) 2017).

Franz Josef Ruprecht (1814–1870), although newly graduated and practising medicine in Prague, had already made extensive plant collections for Heinrich Ludwig Reichenbach (1793–1879) of the Dresden Natural History Museum and Botanical Gardens and published a paper on cultivated grasses, when he made Trinius's acquaintance in 1837 at a meeting of German Naturalists and Physicians (Wunschmann 1889, NHM (BM) 2017). Trinius subsequently recommended him for the position of curator of the botanical collections at the Academy of Sciences in Saint Petersburg, which role he took up in 1839.

Eight sheets of Tasmanian Agrostid grasses are lodged in the Trinius herbarium at LE (App. 1A) and although not stated on the sheets themselves, the source of this material is almost certain to be from collections by Lawrence or Gunn, sent to William Hooker (Brown 2019b, Brown 2021) or John Lindley during the 1830s and before the publication of new taxon names by Trinius (1841) and Trinius & Ruprecht (1842). Although few in number, the LE TRIN sheets of Gunn and Lawrence Agrostid grass collections are important, as they include a number of type specimens. The source of these collections, even on the same sheet, appear to be a mixture of duplicates sent directly from William Hooker to Trinius and duplicates originally sent to Vienna, from which Trinius took samples. The probable earlier duplicates from Hooker appear to be those accompanied by an inked sketch marked 'V.D.L.' or with both an inked sketch and a label marked 'V.D.L' (with or without a number), while the later Vienna duplicates are accompanied with a pencil sketch of spikelets. Three specimens at K have similarly marked V.D.L. markings, while no specimens at W have yet been found to have a 'V.D.L.' tag. The Hooker gifts

Figure 4. LE TRIN–1666.1: a probable amalgamation of *Agrostis venusta, Gunn 593* specimens. **a**. pencil sketch of specimen ex W [probably left-hand specimen]; **b**. ink sketch of specimen ex Hooker [probably right-hand specimen]; **c**. determination by C.E. Hubbard of Kew in 1937; **d**. type determination by R. Soreng of Smithsonian Inst. in 1994. Image kindly supplied by the Komorov Botanical Institute, St Petersburg.

and the Vienna loans (including those of Lindley) likely reached Trinius after his return to Saint Petersburg from his European herbaria tour, but before the publication of *Agrostidea* in 1841.

One of the specimens on sheet LE TRIN–1666.1 (*Agrostis venusta*: Fig. 4) is clearly derived from *Gunn 593* in the 'Hook 1837' consignment to Vienna (W 0025343), as its pencilled sketch is marked as 'ex Familia gram. Vienn' (Fig. 4a) and the collection at W has a determination label of '*Agrostis venusta* m.', probably in Trinius's hand but with the name 'Trinius' in red ink, in another hand. and probably added later. The LE TRIN sheet contains two specimens with an ink sketch (including 'V.D.L.' in ink) (Fig. 4b) as well as the pencil sketch placed centrally between them. It cannot be certain which specimen belongs to which figure, but the smaller left-hand specimen likely derived from Vienna, which probably only had a small duplicate to sample from. As the pencil sketch has its 'ex Vienna' mark written in ink, it is likely the older of the two. Because the two specimens (one of two culms and the other of ten culms) are very similar, they probably derive from the same original collection i.e. *Gunn 593*, of which some remnant material still resides at K (K 000342391 in part and K 000342393 in part).

A sheet of *Lachnagrostis aemula* (LE TRIN–1584.6 *A. aemula*) has an attached ink sketch with 'V.D.L.7 (Hooker)' in ink written on it. The two culms of this collection have been placed over what appears to be a *L. filiformis* collection of unknown origin, with an associated pencil sketch. The *L. filiformis* specimen does not appear to be a duplicate of W nd07 ex herb. Lindley 1839 (as *Agrostis aemula*) (App. 1A). While the sheet of 'V.D.L.7' at LE contains a collection of *L. aemula*, a collection of *L. billardierei* (as *Deyeuxia billardieri*) at Kew (K 000342387) is also marked 'V.D.L.7 Lawrence'. A further sheet at Edinburgh (E 00680889: Fig. 6), labelled 'No.7 Lawrence', is a mixed collection of *L. billardierei* and *L. aemula* and was originally sent to Major Munro by Joseph Hooker in 1852, while a sheet at Cambridge (CGE 34013) also contains a mix of the two taxa. A duplicate of the original collection (though currently missing from HO, NSW and K) of the *L. aemula* on the E and CGE sheets may be the origin of the specimen labelled 'V.D.L.7 (Hooker)' at LE.

Despite an extensive search of K and W, the original source material for 'V.D.L.6' (LE TRIN–1655.1 *Lachnagrostis semibarbata*) cannot be found. It is possible that it was a fragment of a separate taxon mixed in either the source material for 'V.D.L.7' or a collection of *Gunn 592* (*L. aemula*) dating from 1835 (the first year this taxon number was used). Amongst Gunn's 1844 collection of his no. *592*, Hooker separated out this fine-leaved taxon as *Gunn 592/1* (as *Agrostis billardieri* var. *setifolia*) (Brown 2019b).

A sheet of *Dichelachne crinita* at LE (TRIN–1822.1) with two specimens (labelled *'Hooker N.10pp'* and *'Hook. N.24.pp.'*), both determined by Ruprecht (presumably) as *D. longiseta*, was matched by C.E. Hubbard in 1839 to an inflorescence on a sheet at Kew (K 000913405) with the annotation 'This matches the panicles on the type sheet *Dichelachne longiseta* Trin. (Hooker 24 pp. & 10 pp.)'. An additional sheet at LE (TRIN–1821b.1) also has two specimens with Hooker labels ('V.D.L.10' and 'V.D.L.24') and both determined by Ruprecht as *D. hookeriana*. This sheet has an inked sketch of spikelets. Therefore, it appears that Hooker sent two separate collections of *D. crinita* to Trinius, both containing material fitting Ruprecht's concepts of *D. longiseta* (i.e. with long, flexuous lemma awns) and *D. hookeriana* (i.e. weakly geniculate awns). The original collections were accordingly divided, with both of Hooker's labels being used for the *D. hookeriana* sheet and Ruprecht (or Trinius) duplicating Hooker's numbers for the *D. longiseta* sheet. Given the subtle and gradational differences between *D. longiseta* and *D. hookeriana*, they are currently regarded as synonymous with *D. crinita* (Simon *et al.* 2009).

The K sheet annotated by Hubbard has a matching Hooker label of 'V.D.L.10' and although it has no collection details, is assumed to be the source of the material sent to Trinius. Additional culms with very similar inflorescences (K 000913406) on the same sheet have a label "N. of Bathurst" in pencil[2]. All the material

2 A collection of *Dichelachne crinita* was made by A. Cunningham from "West from Wellington Valley", NSW in 1825 (NSW 550311). In 1948, Vickery annotated the sheet with 'Identified as *D. hookeriana* Trin. & Rupr. by C.E.H. after seeing the Type. A dense headed form. I do not agree that it is a perfect match as the glumes are broader to the apex than the fragments of the type at Kew. Look amongst Tasmanian specimens, as sp. was described from there. J. Vickery 1948'. A duplicate of this collection (K 000913407: *Cunningham 104*) was determined by C.E. Hubbard in 1939 as *D. hookeriana* but the type fragments (presumably ex LE) described by Vickery cannot be found at K.

on the sheet conforms to Trinius and Ruprecht's (1842) concept of *Dichelachne longiseta*. No remnant collection of V.D.L.24 material can be found at K. Only one sheet of Gunn's (or Lawrence's) *Dichelachne* at K can be dated to the early 1830s (K 000913404: *Gunn 589*), having later been given by Joseph Hooker to Major Munro in 1852. The material on this sheet conforms to *D. longiseta* and was annotated as an isotype of such by J.F. Veldkamp. However, the collection of *D. crinita*: *Gunn 589* (ex 'Hook 1837') at W was determined by Ruprecht as *D. hookeriana* plus a further collection of *Gunn 589* at CGE tends to have the weakly geniculate awns of *D. hookeriana* and lends support to the hypothesis that *Dichelachne* taxa and forms could have been mixed in Gunn's original collections. Ruprecht determined a *Lawrence 58* (ex Hook) sheet at W as *D. longiseta*. He wrote on a sample packet, attached to LE TRIN–1822.1, *'Dichel. an longiseta'* and what appears to be *'Van Diem. Hook. ad spec. in M. Vindob'* [i.e. Van Diemen's Land ex Hooker in Museum Vienna], which presumably contains fragments of *Lawrence 58*. Also from Vienna was the 'Lindley 1839' collection, which Ruprecht determined as *D. hookeriana* but does not appear to have been sampled for LE. This collection was split into *D. crinita* (W 1997-04385) and *D. rara* subsp. *asperula* (syn. *D. sieberiana*) (W 1997-04384) by Elizabeth Edgar in 1982 (although for this paper, the latter has been redetermined as *D. rara*).

The source of specimens of *Deyeuxia quadriseta* at LE is unclear. On the assumption that specimens with associated inked sketches and 'V.D.L.' labels derived directly from Hooker and pencil sketches were made of specimens from Vienna, the following disentanglement is suggested. The first sheet (LE TRIN–1602.1), consisting of two relatively narrow culms with emerging panicles and a separate leaf sheath and blade, is accompanied by an inked sketch named '*Agrostis diaphora* m.' and a separate label marked 'V.D.L.23'. In 1939, C.E. Hubbard annotated this collection as a duplicate of *Gunn 771* at K (K 000838419) and it does bear a resemblance to the specimens on the right side of the sheet, to which the '*771*' label is attached. In his diary, Gunn notes "*771 quadriseta! from R.W.L's Herb. 57 1836*" (Gunn *ca.* 1830–1850), suggesting that he gave his own number to Robert Lawrence's collection no. *57* of this taxon. Gunn's '1836' on this entry is not a reference to the year of collection (Lawrence died in 1833) but the consignment date when forwarded to Hooker. That Gunn used his number for Lawrence's collection is supported by examination of HO 130804 (Fig. 5) where Lawrence's original label has his number but with Gunn's number added to it in Gunn's hand. The label encloses a number of culms with partially emerging panicles (similar to the K duplicate), while the remainder of the collection, of culms with emerged panicles, is separate to the label. It is possible that Gunn collected *771* separately to Lawrence's collection *57* (maybe from the same site) and combined the two collections on HO 130804. However, without being able to prove this to be the case, it is more judicious to regard *Gunn 771* as Gunn's assignment of his own number to *Lawrence 57*.

A specimen of *Deyeuxia quadriseta* on the right-hand side of sheet LE TRIN–1602.2, consists of a single narrow but leafy culm and base with an emerged, relatively short and narrow panicle (8.2 x 1.0 cm) and accompanied by an unnamed pencil sketch. As for other pencilled sketches, it suggests that this specimen derives from Vienna. Although it may represent a sampling by Trinius of W 0026798 ("V.D.L. *Lindley 1939*"), it does not bear a close resemblance to it (the W panicles being larger at 10.4–12.0 x 1.6–3.2 cm and with broader leaves). As the W 0026798 collection bears Trinius's name in red ink and is determined as '*Agrostis diaphora* m.', it is probably this collection that caused Trinius to include 'Lindley' in his protologue for the species. The original Gunn collection from which W 0026798 was made is unknown but when considered alongside other ex "Lindley 1839" plant collections at W (e.g. *Lachnagrostis rudis*: *Gunn 1005* and *L. billardierei*: *Gunn 1007*, both collected 8.1.1838 from Circular Head and *Dichelachne crinita*: *Gunn 988* collected 11.i.1837 & 8.i.1838 from Circular Head; see App. 1 for details), it probably represents a duplicate of *Gunn 991*, collected on 11.i.1837 from Circular Head. The anthers in the LE TRIN–1602.2 pencil sketch, when measured from the image in comparison to the 2 lines (i.e. 5.1 mm using the Russian conversion of 1 line = 2.54 mm) noted for the lower glume are approximately 1.1 mm long. In contrast, the ink sketch of V.D.L.23 (LE TRIN–1602.1: presumably *Lawrence 57*) shows small anthers at the base of the floret, of about 0.6 mm in length, whereas the original gathering of *Lawrence 57*/*Gunn 771* (HO 130804) has anthers of 0.8–0.9 mm length (Matthew Baker 2018, pers. comm., 17 September). However,

Figure 5. HO 130804: Handwritten specimen label for *Deyeuxia quadriseta*, *Robert William Lawrence 57*, with Ronald Gunn's taxon number of *771* added in Gunn's hand. Image kindly provided by Matthew Baker, Tasmanian Herbarium, Tasmanian Museum and Art Gallery.

without measurement of the actual anthers (and other morphological characters) in the HO, K, CGE, LE and W specimens of *D. quadriseta*, it remains uncertain as to how many original gatherings are represented on the LE TRIN sheets, and whether they are all Lawrence's or Gunn's.

It is probable that the very mature panicle on the left-hand side of LE TRIN–1602.2 which is accompanied by a inked sketch named '*A. diaphora* m.' and the younger specimens of LE TRIN–1602.1 are duplicates sent by Hooker directly to Trinius and correspond to a pair of specimens (i.e. *Gunn 587* & *Lawrence 57*, respectively) with similar morphological characteristics, sent by Hooker to Vienna in the 'Hook 1837' consignment (W 0026799: Fig. 3). Trinius obviously examined the W sheet as well, as evidenced by an '*Agrostis diaphora* m.' label with his name in red ink, attached above the *Gunn 587* label. Based on his determinations on the LE sheets, Trinius obviously regarded both *Gunn 587* and *Lawrence 57/Gunn 177* as representative of his new taxon.

The source of 'V.D.L.17' at LE (LE TRIN–1619.1) (databased as *Agrostis lobata* syn. *Deyeuxia quadriseta* in Soreng *et al.* 1996) is uncertain, although its inked sketch and V.D.L. number indicates a duplicate from Hooker. None of the collections of *D. quadriseta* at HO, NSW, K or W have the strong purplish colouring and obtuse apex of the narrow panicles on the LE collection. Gunn (*ca.* 1830–1850) noted under his listing of '*Bromidium lobatum*/*Agrostis lobata*' that there were "4 vars of this described – differs from *Agrostis quadriseta* in the teeth of the valves being short", but without evidence to suggest that he attempted to separate them himself, he probably left it up to Hooker to do so. As Nees von Esenbeck did not publish the name *B. lobatum* until 1843, Hooker's application of the name to the label of K 000342403 and Gunn's like application to the label of NSW 549202 (both collected over the 1837–1838 season) must have been made at a later date. In fact, the closest specimen in appearance to 'V.D.L.17' is not *D. quadriseta* but *D. lawrencei* Vickery, named for *Lawrence 12* (K 000838424), except that the latter panicle has only a hint of faded purple. From the images examined, the specimen at K has a panicle approximately 9 cm long and spikelets about 7 mm

long, while that at LE has panicles 6–7 cm long and spikelets about 6.5 mm long. Vickery (1940) separated *D. lawrencei* from *D. quadriseta*[3] by the relative length of the lemma compared to the glumes, i.e. "lower lemma less than half, or scarcely more than half the length of the lower glume" for the former and "lemma not less than two thirds the length of the glumes" for the latter. In this respect, 'V.D.L.17' conforms to *D. lawrencei*, even though the spikelets appear smaller than the "about 8 mm" specified by Vickery and the hand drawn figure attached to the specimens indicates the upper glume to be 2.5 lines long (6.35 mm). If 'V.D.L.17' is the same taxon as 'V.D.L.12' (and it does seem to be the case), then Hooker's '12' must have been renumbered or miswritten as a '17' on the label attached to the specimens sent to Trinius.

The Munro duplicates: Another set of Gunn grass duplicates from the Hooker herbarium were given by Joseph Hooker from Kew in 1852 (Fig. 6) to Major (later General) William Munro (1818–1880), a soldier with the British 39th Regiment stationed in India, Barbados and Canada, and a specialist in grass taxonomy. As early as 1840, when only 21 and still serving in India, Munro was elected as a Fellow of The London Linnean Society (Linnean Soc. 1849), having already made many plant collections and produced a manuscript of *Hortus Bangalorensis* (Munro 1837). In 1847, after 14 years in India and 3 years being moved around England, Munro and the 39th were posted to Cork, Ireland (Archer 2017), during which time he obtained Hooker's set of collections. With respect to the Agrostid grasses, a dozen collections were found ex Munro's herbarium and include some of the earliest of Gunn's and Lawrence's collections (e.g. *Lawrence 7* and *Gunn 589*, *590*, *592* and *593*) and possibly one of Hooker's own (no. *433*). In 1853, Joseph wrote that these specimens formed part of "a huge collection of duplicates, which will be essential for working up such genera as *Arundinella*" (Huxley 1918). Hooker obviously had great respect for Munro, as he also writes "What a glorious Grass-man Munro is ; he reduces my father's Herb. to about 1600 species ; I quite expected they would come down to 2000." (Huxley 1918). And, from Melbourne, Ferdinand von Mueller began a letter to Munro in 1879 with "Allow me, dear General Munro, to consult you as the greatest investigator of Gramineae ....." (Home *et al.* 2006). In his will, Munro noted "I direct my trustees hereinafter named to present my Herbarium and such of my botanical and other works of a scientific description or otherwise as they shall think fit to select as a library or collection of books of reference to accompany the same to such public body or person or persons as will best ensure the retention of the same as National Property in connection with the Royal Palace and Gardens at Kew" (Archer 2017). As well as the majority of these duplicates finding their way back to K, some were forwarded to Edinburgh (E), along with many other Kew collections, probably during the early 1880s. However, during his lifetime, Munro sent at least one of these duplicates (W 1916-0027254) to Hackel at St. Pölten and others appear to have been distributed further afield.

Some Gunn grass specimens ex J.D. Hooker in the Asa Gray Herbarium at Harvard University bear labels written in Munro's hand. One of these (*Gunn 592 Lachnagrostis filiformis* in part GH nd02) also has a label for Herb. George Thurber (purchased 1890). This set of duplicates may have been sampled from the Hooker 1852 gift and passed on to Thurber in 1859, as a letter dated 11 Feb 1859 from Lieutenant Colonel Munro, stationed in Québec at the time, to Thurber, notes an exchange of samples (Thurber & Munro 1848–1859, Archer 2017). Thurber (1821–1890) was an American botanist engaged in the Mexican Boundary Survey of 1850–1854 and was later appointed Professor of Botany and Horticulture at Michigan Agricultural College (Rushby 1890).

The Gunn grass collections from Lindley's herbarium that bear Munro's determinations (see *'The John Lindley Duplicates'*) give no indication that they ever formed part of Munro's herbarium but were only examined by him. As noted above, the most likely time for Munro to have made his determinations was in the 1847–1853 period, while he and his regiment were stationed in the United Kingdom. Munro's determination of '*Agrostis* (*Trichod.*) *venusta* Trin.' for one of Lindley's sheets is very

3 Vickery determined *Deyeuxia lawrencei:* K 000838424 (*Lawrence 12*) as a separate species to *D. quadriseta* in 1838, but although this specimen was physically separated from *D. quadriseta*: K 000342404 (*Gunn 1489*), with which it originally shared the same herbarium sheet (the original sheet being cut and the two parts remounted on fresh sheets), she may not have viewed the latter, as it lacks her determination. Nevertheless, she (Vickery 1940) appears to cite other specimens at K that also do not have her determination label (e.g. *D. quadriseta, Gunn 1447*: K 000342417).

Figure 6. E 00680889: an example of a set of Gunn and Lawrence specimens sent to Major William Munro from Joseph Hooker in 1852, bequeathed to K on Munro's death and forwarded to E . **a**. typical label for this set of specimens; **b**. determination by Munro; **c**. the only specimen of *Lachnagrostis billardierei* on this sheet [the rest are *L. aemula*]. Image accessed from https://data.rbge.org.uk/search/herbarium/?family=&genus=&species=&coll_name=&coll_num=&barcode=E00680889&country_name=&region=&major_taxon=&cfg=vherb.cfg&keywords=

similar to his determination of '*Agrostis* (*Trich:*) *venusta* Trin.' on one of J.D. Hooker's 1852 sheets, and suggests they were made at a similar time and therefore in or post 1852. The fact that Trinius (1841) does not refer to *Trichodium* Michx. in relation to *A. venusta*, shows that *T. venusta* ined. was considered as a possible new binomial by Munro. On the Lindley sheet, Munro also wrote '*Trichodium gunnii* Hook: Fil:', which appears to be another potential Munro binomial based on the J.D. Hooker manuscript name of *A. gunnii* ined., which appears on two K sheets: one from Gunn's '1837' consignment and one from his 1846 consignment. Unlike the bulk of Lindley's grass specimens, this set of collections have no determinations by Nees von Esenbeck, which suggests that Lindley did not receive them from Hooker until after the publication of *Gramina Novae Hollandia* (Nees von Esenbeck 1843), or at least after Nees examined his herbarium. One of the collections (*592*) (Fig. 2c) has been mounted on the same sheet (CGE 34010) as *Lachnagrostis drummondiana* (Steud.) S.W.L.Jacobs, collected in 1839 by Georgiana Molloy (1805–1843) (Fig. 2d) for Captain James Mangles (1786–1867), who shared specimens and seeds with John Lindley, then secretary of the Horticultural Society of London (Hasluck 1967). Also mounted on this sheet is a George Everett Esq. 1838 specimen of *L. aemula* that has a determination by Nees (Fig. 2a). Munro has made identical inked determinations of *Deyeuxia aemula* Kunth. on the labels associated with both the *592* and Molloy specimens and a similar but pencilled determination of the Everett specimen (Fig. 2b). As the *592* specimen slightly overlies the Everett specimen, it and the Molloy specimens appear to have been mounted on the sheet at a later time, post Nees' examination but before Munro saw them. At least three other Molloy 1839 grass collections (*Vulpia bromoides* (L.) Gray, *Amphibromus neesii* Steud. and *Rytidosperma setaceum* (R.Br.) Connor & Edgar) at CGE ex Lindley also have Munro inked determinations. As for CGE 34010, one of these has been mounted on a sheet containing a specimen with a Nees determination: in this case *Gunn 995* ex Gunn's '1837' consignment.

Not only did Munro examine and make determinations on Lindley's ex Gunn and ex Molloy grass collections, but he did the same for Bentham. His pencil determinations appear on at least two Gunn grass sheets (*Lachnagrostis billardierei* and *Echinopogon ovatus*) and three J. Drummond, Western Australian grass sheets (*Amphipogon amphipogonoides* (Steud.) Vickery, *A. turbinatus* R.Br. and *Rytidosperma caespitosa* (Gaudich.) Connor & Edgar) which were given by Lindley to Bentham in 1838 and are now lodged at K. None of the associated labels for these sheets have Nees' determinations but some have Bentham's determinations, which indicates that Nees made his determinations after 1838. At least two Gunn collections (*Deyeuxia quadriseta* and *Dichelachne crinita*) and one Drummond collection (*R. caespitosa*) ex Hackel ex Bentham ex Lindley 1838 with Munro pencil determinations are at W. In addition, at least two collections (*Chloris ventricosa* R.Br. and *Triodia mitchellii* Benth.) from the 1846 Major Mitchell expedition to Queensland ex Bentham at K have Munro's pencilled determinations. These Mitchell collections supports the hypothesis that Munro made his determinations on the ex Lindley and ex Bentham specimens after 1846, at least.

One specimen of *Lachnagrostis rudis* at the Ville de Genève (G 00412131: Fig. 7) has had a particularly convoluted history, involving Munro. Presumably a duplicate of the January 1838 *Gunn 1005* collection from Circular Head (App. 1B) and sent in the '1837' consignment to William Hooker, it was passed on to George Bentham in 1844. More than 60 other Gunn collections at K from Herbarium Benthamianum bear the same 'Tasmannia R. Gunn 1844' label and represent many of the taxa described by Joseph Hooker in 'Contributions to the Flora of Van Diemen's Land' published in his father's Journal of Botany (Hooker 1834, 1840, 1847), prior publication of the *Flora Tasmaniae* (Hooker 1860). A comparison of the Gunn collection numbers for these taxa with their presumed dates of collection, which range from 1832 to 1842 (Gunn ca1830–1850), indicates that the 'R. Gunn 1844' on the label refers to the year of acquisition by Bentham and not the actual collection date. Although the 'Contributions' do not describe grasses, Joseph's intentions were to continue the series (Hooker 1847) and such may have been included, had he done so. Bentham appears to have donated the specimen of *L. rudis* to William Munro in 1849, from whom it was acquired by Pierre Edmond Boissier in Geneva. Boissier visited London in 1860 (le Liévre 1994) where he may have met up with Munro on one of his visits home on leave from his regiment, then stationed

Figure 7. G 00412131: an example of a duplicate of *Lachnagrostis rudis, Gunn 1005*. **a**. George Bentham label on receival of the specimen from Joseph Hooker in 1844 and passed to William Munro in 1849. **b**. Pierre Edmond Boissier label on receival of the specimen from Munro [incorrectly determined as *Agrostis parviflora*]. Image kindly provided by the Conservatoire et jardin botaniques, Geneva.

in Bermuda. Boissier's label reads *'Agrostis parviflora* R.Br. var. *A. scabra* Anton' Land [= Anton Van Diemen's Land] ex Munro'. After Boissier's death, his son-in-law, William Barbey (1842–1914), housed his herbarium, along with his own and that of Georges François Reuter in a newly built conservatory in Geneva (le Liévre 1994; Jacquemoud 2011). The Boissier Herbarium was granted to the University of Geneva in 1918 and finally passed to the CJBG in 1943.

William Archer's samplings: William Archer (1820–1874) was a Tasmanian-born architect, naturalist, landowner and politician (Stillwell 1969; Cave 2012). He collected across central-northern Tasmania, mainly from the late 1840s and into the 1850s and thereby started his botanical interests as Ronald Gunn's started to decline. Though the two men corresponded to some extent, they are not known to have jointly collected or exchanged specimens. Archer had little regard for large collections from which duplicates could be drawn, as he was more interested in making as complete a collection of Tasmanian plants as he could for his own herbarium alone (Cave 2012). The first entry in his personal diary, dated 1 January 1848, notes his intention to collect and describe all the grass species of Tasmania, of which he had already had a dozen genera (Hansen 2007). Although most of his collections at HO and NSW are unnumbered, about half of his grasses are numbered from 14 to 82 and likely represent these early collections. Most of his collections, including the grasses have no location and date information. Over the next eight years, Archer continued to amass his herbarium, sending some duplicates to Joseph Hooker and John Lindley to identify (Hansen 2007). He spent 1856–1859 in England, studying botany, extensively examining the collections at K and providing his own herbarium, notes, analysis and drawings for assisting Hooker in the production of *Flora Tasmaniae* (Hooker 1860; Hansen 2013). During 1858 and 1859, he, with the assistance of Hooker, took duplicates of all the Tasmanian material he could access (Hansen 2007), including collections by Gunn and of grasses (Cave 2012) and presumably of Gunn's grasses. No doubt this action relieved the Hookers of 'excess' duplicates but as many of Archer's 'specimens' are small and fragmentary and his labelling left a lot to be desired (Cave 2012), identifying duplicates of Gunn's grass collections is practically impossible. Perhaps the unnumbered grasses at HO and NSW represent samplings from K, but there is no way to be certain. After Archer's death, his herbarium, being too expensive for any Tasmanian botanist or organisation to purchase, was acquired by Joseph Hooker, with the result that many of the duplicates that Archer gathered from K, 15 years earlier, went back to K (Hansen 2007). One example of a probable K duplicate sampled by Archer is *Carex inversa* (K 000961095) with the label '*6. Tasmania. Archer. July. 1858!*' but there is no indication from whose collection it originated. Despite the bulk of his herbarium going to K, there are still more than 1200 Archer collections (including probable duplicates) at NSW and HO, including 80-odd Poaceae, of which 23 are Agrostid grasses (Table 1). Archer replaced Milligan as Secretary of the Royal Society of Tasmania in 1860 and probably, like his predecessor, donated some of his collections to it. When Gunn's Herbarium was sent from the Royal Society to NSW in the early 1900s, most, if not all, of Milligan's and Archer's collections, remaining in Hobart, went with it. A special label was printed for the sheets of 'Gunn's Herbarium of Tasmanian Plants'. A separate but similar label was printed for 'W. H. Archer's Herbarium of Tasmanian Plants'. At some point, some of the 'Archer' labels were pencilled over with Gunn's name (App. 1C), but whether others should also have been treated the same, is unknown. One Archer-labelled sheet of *Agrostis parviflora* (NSW 548820; originally determined as *A. scabra* Willd.), consisting of two separate and morphologically dissimilar specimens appear to have been sampled from two separate *Gunn* collections on a single sheet at K (K 000838280). Although the K sheet has a single label (Mt Wellington, 1.iii.1839, *Gunn 1449*), only one of the collections is similar to those labelled as such at NSW (NSW 548811; NSW 548824). The other collection is similar to NSW 548818 and NSW 548825 (base of Mt Wellington, 7.i.1841, *Gunn 1448*).

The post-Hooker (1860) distribution: Soon after the completion of *Flora Tasmaniae* by Joseph Hooker in 1860, dried sets or exsiccatae of Gunn's and Archer's Tasmanian plant specimens were compiled for various herbaria throughout Europe and America. Complete or partial sets of Gunn's grasses from this distribution have been found at C, CGE, E, G, GH, GOET, L, M, NY, OXF, P, S, TCD, UPS, US, W, WU and Z+ZT (App. 1D), and together they make up 48% of all the Gunn duplicates. A similar

distribution was made of New Zealand plant duplicates in 1854 after the completion of Joseph's *Flora Novae-Zelandiae* (Hooker 1853), as is evident from collections at G, GH, P, S and W, at least. Accompanying the distributed specimens were the names used in Hooker's floras, written on either of two different label designs. The Poales and a scattering of non-Poales genera had a cream (sometimes white) label with print script (Fig. 8a), while the remainder of families and genera had a grey label with cursive script. The 'post-Hooker (1860)' sets of Tasmanian plants were not only numerous but consisted of large numbers of specimens. For example, the complete sets sent to S, P, M, L and B numbered c200, c240, 560 (including specimens from William Archer), c600 and 710 respectively. So much material supports Hooker's concerns about being "overpowered with duplicates" from Gunn.

The set of Gunn grass specimens sent to P has the label 'Donné par Sir William Hooker, 1863' (Fig. 8) which is the probable year of their arrival in Paris. The standard 'post-Hooker (1860)' labels on the G set are marked 1863, the Historical Inventory at M notes receival of acquisitions from Hooker f. in 1863 and so does the acquisition for B (Urban 1916). However, not all the sets were sent in this year. For example, the sheets in the set at CGE bear the label 'Added by Prof. J. S. Henslow' and as Henslow died in 1861, these duplicates must have been sent very soon after, or even in anticipation of the publication of the *Flora Tasmaniae*.[4] On the other hand, the 'post-Hooker (1860)' set at E (i.e. those specimens without indication that they are ex Lindley or ex Munro) bear an identical label, 'From the Herbarium, Royal Gardens, Kew. Presented', to the sheets of Munro's bequest, sent from K to E after his death in 1880, indicating that both sets were sent at the same time and 20 years after publication of the Flora. It cannot be assumed that all of the original sets were complete or composed of the same taxa. Different individuals and institutions may have only been sent duplicates of plant groups of interest to them.

The evidence from Gunn's and Hooker's letters and the division and distribution of Gunn's early and relatively meagre collections to Lindley and Bentham, and to Vienna and Saint Petersburg (App. 1A), suggests that the 'post-Hooker (1860)' exsiccatae are likely to derive, in the main, from Gunn's later and probable larger collections of the '1837' and 1846 consignments (App. 1B & C).

Although the labels for the sheets are of similar style, there are five variants, based on the length of the horizontal line below the 'ex. Herb. Hook.' heading: 1. 43 (10, 10); 2. 41 (8, 10); 3. 39 (8, 8); 4. 37 (6, 8); 5. 35 (4, 8) (the numbers in parentheses being the length the lines exceed the 23 mm heading on the left and right respectively). These variants probably reflect different printing runs, even though the same, but unknown, hand has written the taxon names throughout the series. Not all collections in each herbarium exsiccata have the same variant, although there is a predominant or primary variant label for each (Table 4). This suggests an initial sorting of taxa into sets, using the same label variant, with additional taxa added to each set over time, using whichever label variant was on hand. Each exsiccata also varies in the number of taxa represented, probably as the result of diminishing available specimens in each Gunn collection. Taxa with the fewest specimens included *Deyeuxia monticola* (as *Agrostis montana*), *Lachnagrostis billardierei* (as *A. billardierii*) and *Polypogon monspeliensis*. Of those exsiccatae found in the current study, the more complete sets of taxa were sent to P, TCD and Asa Gray at GH (primary label variant 1), W, L and M (primary label variant 2) and GOET and C (primary label variant 3) (Table 4). Taxa with a majority of secondary label variants, suggest that Hooker did not confirm their determinations until after the bulk of the sets had been sorted. These include *Pentapogon quadrifidus* (labelled as *P. billardierii*), which is superficially similar to *Dichelachne* spp., the highly variable *L. aemula/L. filiformis* complex (labelled as *A. aemula*) and *L. rudis* (labelled as *A. aequata*), which, at this time, was often confused with *Deyeuxia scaberula* (labelled as *A. scabra* R.Br. non Willd.).

4 John Stevens Henslow (1796–1861) was Professor of Botany at the University of Cambridge from 1827, tutor to Charles Darwin and father-in-law to Joseph Hooker. The 'post-Hooker (1860)' sheet of *'Agrostis quadriseta'* at Cambridge (CGE 34016) ex Henslow was determined as a mixture of *Deyeuxia quadriseta* and *D. densa* Benth. by Joyce Vickery in 1938. Consequently, Vickery (1940) included Gunn in her citations for Tasmanian collections of *Deyeuxia densa* Benth, although Bentham (1878) had not previously done so but described the species from collections made by Mueller in South Australia and Victoria. As this is the only determination of *D. densa* in regard to Gunn, and Henslow characteristically 'collated' specimens from different locations and by different collectors on the same sheet, in order to study variation within plant species (Kohn *et al.* 2005), it seems likely that the specimen of *D. densa* on this sheet was added by Henslow from another source. The specimen has been mounted on top of that of *D. quadriseta*.

Three 'post-Hooker (1860)' sets of sheets were identified on the online database for the Musèum national d'Histoire naturelle (MNHN 2020), Paris and later (Oct 2019) viewed in person. One set was presumably sent directly to P, while a second set was sent to Sébastien René Lenormand, a private collector in Normandy, whose herbarium, following his death in 1871, went to the University of Caen, who subsequently sent it with some 270,000 phanerogam specimens to P in 1974 (Le Bras *et al.* 2017). As the Lenormand set is not complete (only five collections compared to 14 in the first set), it is possible that some sheets were destroyed during the carpet bombing of Caen during WWII. A third set was sent to Alexander Georg von Bunge (1803–1890) at the University of Dorpat, Estonia. These sheets were passed on to Elias Magliore Durand (1794–1873), a French born, American botanist and from Durand to Ernest Saint-Charles Cosson (1819–1889) of Paris. Cosson's herbarium of 500,000 sheets were acquired by P in 1904 (Le Bras *et al.* 2017). Although a few of the Bunge set lack the Durand–Cosson stamp ('Herbier E. Durand. Donation En Docteur E. Durnad. Ancien Herbier E. Cosson') common to the majority, it appears that these specimens were remounted at some stage onto newer and therefore unstamped sheets.

Two sets of 'post-Hooker (1860)' were found at the herbarium (G) of the Conservatoire et Jardin botanique, Geneva (CJBG). The first, marked as '1863' was sent to Alphonse de Candolle (1806–1893), the son of the Swiss botanist, Augustin Pyramus de Candolle (1778–1841), who took over his father's Chair of Natural History at the University of Geneva. The de Candolle's private herbarium was donated to the Ville de Genève in 1921. A second set was sent to de Candolle's ex-student, Pierre Edmond Boissier.

Three 'post-Hooker (1860)' sets of sheets were found at the Herbarium of the Natural History Museum Vienna (W). Only the three sheets of *Lachnagrostis rudis* have been databased, following their typification by L. Pignotti in 2010. The first set of specimens are without any dates, except for *Dichelachne sieberiana/D. crinita* (as *D. sciurea*), with 1997 as the year the collection was separated into individual taxa, following determination by Elizabeth Edgar in 1982. Although three of the sheets in the first set have a rectangular stamp with 'Naturhistorisches Museum Wein', two have a small elongated octagonal stamp with 'Herbarium Musei Caesar Palat. Vindobonensis' and the remainder are unstamped, they all appear to belong to the same exsiccata, with a single sheet per taxon. The set was probably sent to Eduard Fenzl (1808–1879), Professor of Botany and Director of the Imperial Botanical Cabinet in Vienna. Fenzl's predecessor was Stephan Laislaun Endlicher (1804–1849), who was appointed Curator of the Botanical Department of the Royal Natural History Museum in 1836 and Professor of Botany and Director of the Botanical Gardens of the University of Vienna in 1840. During his tenure, and under Imperial direction, he amalgamated all of the plant collections across Vienna, including his own private herbarium of 30,000 species into one general herbarium (Rompel 1909). It would probably have been to Endlicher, that William Hooker and John Lindley sent duplicates of Ronald Gunn's early collections. In 1871, construction for the new K.K. Naturhistoriches Hofmuseum (Imperial Royal Natural History Court Museum) and forerunner of the Natural History Museum (NHM), was begun and officially sanctioned by Emperor Franz Joseph I in 1876 with the appointment of Ferdinand von Hochstetter (1829-1884) as its Imperial Intendant (Chief Curator). Work on the Museum was practically completed by 1881 but its official opening to the public was not until 1889. Anton Joseph Kerner von Marilaun (1831–1898), former Professor of Natural History at Innsbruck, became Fenzl's successor at the University of Vienna in 1878 and Director of the Museum and Botanical Garden. Although the existing herbarium was transferred from the University to the NHM (W), Kerner, using his own private herbarium as a base, instigated a new herbarium at the University (WU). At W, stamps of various design indicating the Imperial nature of the plant collections were used up until 1921. Following the collapse of the Habsburg Monarchy, as an outcome of WWI, the 'Naturhistorisches Museum Wein' stamp was used when databasing both old and new herbarium sheets. Many sheets at W still remain to be databased or even stamped. During the 1880s, many collections were incorporated into the new herbarium, and it was during this time that the second 'post-Hooker (1860)' set was either transferred from the old herbarium or newly acquired. The second set is stamped 'Musei Palat. Vindob 1886 *No.*' with a number from *7632* to *7687*, written in ink. The 1886 date relates to the year

Table 4: Post-Hooker (1860) label variants for exsiccatae of Gunn's Tasmanian Agrostid grass taxa.

Taxa		*A. venusta*	*A. parviflora*	*A. quadriseta*	*A. aemula*	*A. billardierii ß*	*A. scabra*	*E. ovatus*	*A. aequata*	*D. crinita*	*P. billardierii*	*D. sciurea*	*P. monspeliensis*	*A. billardierii*	*A. montana*	Total specimens
Herbaria[a]	Primary label variant[b]															
P	1	1	1	1	3	1	1	1	1	1	2	5	1	3	1	14
TCD	1	1	3	1	4	1	1	1	1	1	3	1	1	3	1	14
GH_g	1	1	1	1	3	1	1		2	1	3	1	1	2	1	13
W	2	2	2	2	2	2	2	2	2	2	5	3	2	2		13
L	2	2	2	2	2	2	2	2	3	2	1	3	2			12
M	2	3	2	2	2	2	?	2	4	2	5	4	2			12
GOET	3	3	3	3	1	3	3	3	4	3	1		3	3		12
C	3	3	3	3	1	3	3	3	3	3	4	4				11
CGE	4	4	4	4	5	4	4	5	1	4	4					10
G_c	5	5	5	4	5	4	4	5	2	3	2					10
W_{86}	5	5	1	5	4	5	5	1	1	5	4					10
W_r	5	5	5	5	4	5	5	1	4	5	3					10
S	3	3	3	2	2	3		?	3	3		5				9
ZT	4	4	4	4	5	4		4	5	4						9
P_b	5	1	1	5	5	5	5	5	5		2					9
WU	5	5	5		4	5		5	5	5	2					8
E	2	2	2	2	5	4	2	2								7
US	2	2	2	2	5	5	1	2								7
G_b	4	4	4	4			4	4	4		1					7
OXF	4	4	4	4	2	5	4	2								7
NY_c	2	2	2	5	2		4	3								6
NY_m	3	3	3	3	3	3	1									6
UPS	3	3	3	3	3	3		3								6
P_c	1	1		1	4	5	1									5
GH_k	5	5	5	4	1		5									5
US_g	5	5	5	4	4		5									5
Total specimens		**28**	**27**	**25**	**25**	**22**	**22**	**21**	**17**	**15**	**15**	**8**	**7**	**5**	**3**	**239**
Specimens with secondary label variants		**2**	**3**	**5**	**17**	**5**	**3**	**5**	**9**	**0**	**14**	**6**	**0**	**3**	**0**	**75**
% secondary label variants		**7**	**11**	**20**	**68**	**23**	**14**	**25**	**53**	**0**	**93**	**75**	**0**	**60**	**0**	**31**

[a] G_b = G ex Boissier, G_c = G ex herb. de Candolle, GH_g ex herb. Gray, GH_k = GH ex Royal Gardens Kew, NY_c = NY ex herb. Columbia College, NY_m = NY ex herb. Meisner, P_b = P ex herb. Bunge/Cosson/Durand, P_c = P ex CN ex herb. Lenormand, US_g = ex herb. Gray, W86 = W ex 1886 acquisition, W_r = W ex herb. Reichenbach. [b] variant 1 = 43 mm heading underline length (10 mm and 10 mm leading and trailing portions respectively), variant 2 = 41 mm (8, 10 mm), variant 3 = 39 (8, 8 mm), variant 4 = 37 mm (6, 8 mm), variant 5 = 35 mm (4, 8 mm); ? = image not available. Note: one of the two '*A. billardierii ß*' specimens at S has been reassigned to UPS (see text).

the sheets were acquired, or at least, incorporated by W but there is no indication as to where the set came from. The third 'post-Hooker (1860)' set was sent to Heinrich Gustav Reichenbach (1823–1889) Professor of Botany at Leipzig University until 1862 and thereafter Director of the Botanical Gardens at Hamburg University, whose herbarium was bequeathed to W upon his death.

A fourth set of 'post-Hooker (1860)' sheets were found in Vienna at the University Herbarium (WU). These are stamped 'Acq. Journ.No. 305', which is listed in the herbarium's acquisition journal as "305, 27. März 1884, Kew Garden, Exotische Pflanzen, Äquivalent für Flora Exsiccata Austro-Hungarica" (Walter Till 2020, pers. comm., 8 October). This entry suggests that Kerner exchanged a set of Austro-Hungarian collections for a set of collections from Joseph Hooker in 1884, but whether or not the Kew duplicates only encompassed Australasian[5] plants or not is unknown. As for this set, the second 'post-Hooker (1860)' set at W may have been sent directly to von Hochstetter's successor, Franz Ritter von Hauer (1822–1899) at a similar time (c1886). Both sets are dominated by variant 5 labels.

Two of the grass taxa in the 'post-Hooker (1860)' collections at Stockholm (S) have two representative sheets, each with an original label. As neither of these are represented at UPS and the 'post-Hooker (1860)' grasses at UPS are represented at S by only one sheet, it suggests that both Swedish sets were originally sent to Stockholm, with the intention that one be sent on to Uppsala.

A few Gunn plant specimens 'ex Herb. Hook.' but no grasses, are recorded for Halle Herbarium (HAL) on the JACQ Virtual Herbarium site (JACQ consortium 2004 ff.). JACQ also records HAL as a repository for other Australian grasses, particularly those collected by Franz Sieber (1789–1844). However, a search through the non-databased collections failed to find any Gunn grass collections (Uwe Braun 2018, pers. comm., 9 October).

Searches at Berlin (B) for Gunn's Agrostid grasses has also failed to find any examples (Robert Vogt 2018, pers. comm., 8 November). However, B does have a collection of *Amphibromus neesii* Steud. (B 10 0296879) bearing the standard 'post-Hooker (1860)' label as *Danthonia nervosa* H.f. This sheet contains a further specimen, with a hand-written label of grey paper indicating that the collection came from the herbarium of Nees von Esenbeck and has the inscription '*Amphibromus junceus* N. ab. E. Insula Van Diemen *Gunn n.995* ex parte.'. As the handwriting and label style is similar to those attached to a few of the CGE sheets loaned by Lindley to Nees, the specimen is likely to be a sample removed from a Lindley duplicate. Nees von Esenbeck's herbarium was broken up in 1852 and sold to numerous buyers, including B which acquired almost 10,000 specimens of his Poaceae, Cyperaceae, Juncaceae and Restionaceae in 1855 (Hiepko 1987).

Additional Agrostid grass collections from a 'post-Hooker (1860)' set were probably sent to B. However, as the herbarium was badly damaged during a WWII bombing raid, it seems likely that most of these, along with many other collections (including those on loan from other herbaria) were destroyed (Merrill 1943). Other German herbaria, such as Frankfurt, Stuttgart, Hamburg and Leipzig, were also partially or completely destroyed (Poppendieck 2001) and the fate of some of these collections is unknown. At least some major families (including the Poaceae) at Hamburg, had been evacuated from the city before the bombing. After much negotiation over the intervening decades with Leningrad (Saint Petersburg) and East Germany, to where the collections had been transferred in the post-war era, the collections were returned to Hamburg in 1990. It is unknown as to whether any Gunn duplicates are among those returned and still not databased. At least the 'post-Hooker (1860)' set of Gunn grasses from Reichenbach's herbarium at Hamburg had been sent to W, half a century before WWII.

The most valuable collections of the Department of Botany at Budapest were removed to the countryside in 1944–1945 to protect them from the ravages of WWII but unfortunately, they suffered more than other collections that were left in the city (Matskási 2002). It is not known if any Gunn material was in the damaged herbarium but if so, it no longer exists (Zoltan Barina 2019, pers. comm., 10 November). Likewise, the herbarium of Prague was moved to a castle in Bohemia for safe keeping from Allied bombing but suffered some damage due to poor storage conditions (Danihelki *et al.* 2017). However, there is currently no evidence that any duplicates of

5 Among the Gunn Agrostid grass collections found at WU was one of *Echinopogon ovatus*, sent to Hooker from New Zealand by William Colenso (1811–1899) and also stamped as Acq. 305. Colenso played a similar role as Gunn as a colonial collector for William Hooker (Endersby 2001).

Gunn's Agrostid grasses were ever sent to Prague (Patrik Mraz 2019, pers. comm., 16 January), although a few other Gunn specimens are in the PR collections (Otakar Šida 2019, pers. comm., 17 January).

Apart from Europe, Hooker sent sets of his Tasmanian plants to the USA. The Asa Gray Herbarium (GH) at Harvard University, Massachusetts, contains two sets of Gunn collections. One has the standard cream label attached to a printed label with 'From Herb. Royal Gardens, Kew' while a second set has the standard label only. The first set was probably sent directly to Gray from Hooker. Some of the sheets in the second and larger set have additional specimens attached from the Wellington Herbarium of Thomas Kirk (1828–1898), an English Nurseryman who moved to New Zealand in 1863 and became Curator of the Auckland Institute in 1868. Kirk made many plant collections throughout New Zealand and sent at least 300 duplicates to Hooker at K (KHC 2021). In 1874, he moved to Wellington, but as no Gunn grass collections have been found at WELT (pers. comm. 2020, Leon Perrie, 2 June), it is unlikely that Kirk received or sent Gunn specimens to Gray, along with the duplicates of his own collections.

A number of plant collections from early American Government sponsored explorations, including the 1838–1842 United States (Wilkes) Exploring Expedition of the Pacific were amalgamated at the establishment of the Smithsonian Institution in 1846. However, due to a lack of adequate housing facilities, they were given into the care of John Torrey, who at that time was Botanist of the State of New York (Morton & Stern 2010). Asa Gray was one of the original botanists for the Wilkes Expedition. He had started his own US plant collection from the mid–1820s, been an assistant to John Torrey and curator of his herbarium from 1833–1835 and had spent 18 months touring European herbaria during 1838-1839 (Reveal 2014). Gray and Torrey worked together on the *Flora of North America* (Torrey and Gray 1838–1843) and from 1848–1855, they tackled the difficult task of reporting the results of the Wilkes expedition, utilising not only the Smithsonian collections in Torrey's care, but the facilities of European herbaria: Gray spending a year examining specimens at George Bentham's Estate, working with William Harvey in Ireland and with the Hooker's at Kew Gardens. During this period and probably long after, Torrey and Gray undoubtedly exchanged and sampled each other's collections as well as supplementing their personal herbariums from European collections. By 1860, Torrey had amassed a herbarium of some 50,000 specimens which he sold to the College of Columbia while in 1864, Gray donated his herbarium of 220,000 specimens to Harvard University, of which he was Professor of Natural History from 1842–1873.

In 1868, Torrey decided that he could no longer perform the role of custodian for the Smithsonian and the herbarium was deposited with the newly established Division of Botany within the US Department of Agriculture (USDA) in Washington, who already had their own large collection of agricultural material (Stevenson 1954). In 1895, the Division of Botany became the Division of Agrostology, and by the following year, its herbarium was further amalgamated with the US National Museum herbarium, previously established by Lester F. Ward (1841–1913) in Washington, to become the US National Herbarium (US), and back under the jurisdiction of the Smithsonian. At the same time, Columbia University's herbarium of 600,000 specimens (including Torrey's) formed the foundation of the newly established herbarium of the New York Botanical Garden (NY) (now known as the William and Lynda Steere Herbarium).

Both US and NY have 'post-Hooker (1860)' sheets, of which many may derive from original sets sent to Gray and Torrey. A set of Gunn 'post-Hooker (1860)' plant sheets at US have labels denoting 'Ex Herb. A. Gray' and 'U. S. Department of Agriculture, Division of Agrostology', which presumably were sent from GH before 1896 but labelled between August 1895 and the transfer of the herbarium to US. A second set with 'Herbarium of U. S. Department of Agriculture' labels, presumably preceeds the establishment of the Agrostology Division, and may have been sent directly to the Smithsonian herbarium, then under the care of Torrey and before it was sent to the USDA. One set at NY, which apart from the 'ex Herb. Hook.' labels, are mounted on unstamped blank sheets. They can only be assumed to be ex Columbia College and addressed to Torrey. A second set of 'post-Hooker (1860)' Agrostid grasses are lodged at NY as 'ex Herb. Meisner'. John Jeremy Crooke (1824–1911), a New York businessman purchased the herbarium of the late Carl Meisner (Meissner) (1800–1874), Professor of Botany

at the University of Basel, Switzerland and presented it to Columbia College in 1874, the year after Torrey's death (Britton 1887; Small 1901). This set has a 'Meisner Herbarium' stamp in the same style as the 'Torrey Herbarium' stamp used for Torrey's pre-1860 collections and suggests that both stamps were manufactured at the same time and used after 1873. A further sheet at NY, not marked as part of a 'post-Hooker (1860)' set, has two small specimens of *Dichelachne sieberiana* (as *D. sciurea*) which came from the herbarium of George Valentine Nash (1864–1921) in 1911. Nash, who was eventually to become Head Gardener and Curator of Plantations at the New York Botanical Garden received this collection, along with many other grass collections, from George Thurber between 1888 and 1890, with whom he shared an interest in grasses (Britton 1921). As Thurber had, in turn, received the specimens from Asa Gray, it is probable that they were sampled from the 'post-Hooker (1860)' set sent to Gray.

Although extensive searches have been made for Gunn Agrostid grasses across many of the herbaria of Europe and limited searches have been conducted in America, it is probable that additional sets of 'post-Hooker (1860)' sheets are still to be discovered in collections that are either not accessible via the medium of Virtual Herbaria or have not yet been databased.

Mueller in Melbourne: Ferdinand von Mueller (1825–1896), at the Melbourne Botanic Garden, received Tasmanian plant material from a large range of collectors. The most prolific collections at MEL are those of Charles Stuart (3195 specimens) and Augustus Frederick Oldfield (209 specimens) collected in the 1850s, Samuel Hannaford (526 specimens), Rev. John Fereday (246 specimens) and Dr George Fordyce Story (814 specimens) in the 1860s and early 1870s, Emma Oakden (257 specimens) in the 1880s and Rev. John Bufton (1034 specimens) (AVH 2021). However, there are also 453 of Ronald Gunn's collections at MEL (AVH 2021), of which very few appear to have been sent directly to Mueller.

Mueller was appointed as Government Botanist for the Colony of Victoria by Lieutenant-Governor Charles La Trobe in January 1853. On the 30 June 1853, La Trobe wrote to his friend Ronald Gunn: "My clever little Botanist has returned having done quite as much as I expected & more than any but a german, drunk with the love of his Science, – & careless of ease – & regardless of difficulty in whatever form it might present itself – could have effected in the time & under the circumstances ..." (Home *et al.* 1998). Mueller actively exchanged plants with other members of the botanical community and was keen to do so with Gunn as well. Within a month of La Trobe's introductory remarks, Muller wrote to Gunn: "Sir, Upon the suggestion of his Excellency Governor La Trobe, I take the liberty of addressing this few lines to you with my greatest desire to establish henceforth a botanical correspondence and a mutual exchange of plants with a gentleman, who has so largely contributed towards the development of the Tasmanian Flora. Having been engaged for nearly 6 years now more or less in the examination of Australian plants, I am happy to say, that I am enabled to offer named specimens of a large number of species foreign to your shores for such as I not yet possess from V.D.L. Should your time, Sir, and the [store] of your collections permit this, I would find you a list of those which I would be delighted to receive for the increase of the material for my "Flora Australiae universa." and would return you an equal number, which will prove, I believe, entirely new to your collection. Could you spare me 2 specimens of each species, I would acquire then one for my private collections, giving such in return as I obtained before the office I am holding now was entrusted to me. I have the honor, Sir, to subscribe myself your obed. and devoted servant. Dr Ferd. Mueller." (Home *et al.* 1998). Although further correspondence between the two men show the exchange of a scattering of specific plant specimens, it seems that Mueller could not persuade Gunn to provide him with examples of his whole collection. Instead, Mueller needed an alternative means to obtain such. On 22 August 1862, Joseph Hooker wrote to Mueller: "My dear Mueller....I am distributing Gunn's Tasmanian plants now, & shall put aside a good set for you which will go in Autumn together with some other things that will I hope prove acceptable." (Mueller Corres. 2019). The date of this letter corresponds with the 'post-Hooker (1860)' distribution discussed above and matches with the 1863 date for the sets received by P and G (App. 1D). However, the promised set for Mueller has not been found at MEL, or at least, not with the standard 'post-Hooker (1860)' label. Whether this promised set was redirected to another herbarium by Hooker or lost in

transit is unknown, for no further correspondence about the matter has been found. Whatever the outcome, a frustrated Mueller again wrote to Gunn on 5 March 1870, soon after a hurried visit to Tasmania's Mount Field East (Home *et al.* 2002): "Since some time I am engaged on the examination of the monocotyledonous plants for the flora of Australia, dear Mr Gunn, and the wish arose often to see your collection of them, as probably some of the Glumaceae are not yet contained in the "Flora Tasmanica" (sic) ... I suppose it is not possible to obtain your whole collection on loan? I should have had far more frequent occasion to allude to your plants, had I had access to your specimens." (Mueller Corres. 2019). Mueller made a second visit to Tasmania from 27 January to the 14 February 1875, spending time at Circular Heads and Arthur River (Churchill *et al.* 1978) but it is not known if he met Gunn during this trip or ever had the opportunity to examine his herbarium. In a letter to de Candolle on 4 August 1880, Mueller lists all the botanists from whom he has obtained specimens, which included Joseph Milligan of Tasmania: "I obtained a complete collection from Dr Milligan" (Mueller Corres. 2019), but not Gunn. There are 803 of Joseph Milligan's collections at MEL

The major dicotyledonous families represented among the Gunn collections at MEL are Asteraceae (48 sheets), Fabaceae (43 sheets), Ericaceae (31 sheets) and Rutaceae (21 sheets). Most of these derive from the herbaria of Otto Wilhelm Sonder (1812–1881) and Joachim Steetz (1804–1862), both of Hamburg. Mueller had long-term plant exchange programs with both men and purchased their herbaria after their deaths and before the establishment of Herbarium Hamburgense (HGB) (Macheda & Vaughan 2019; Short & Sinkora 1988; Short 1990).

As early as 21 November 1853, Mueller wrote to William Hooker: "I have stated, that my collections under the hands of Dr. Sonder contain more than a thousand species of Van Diemen's Land plants. .... Of these, as well as any other Australian plants of my collection, I shall be but too happy to offer Dr. Joseph Hooker any specimens which he may consider useful to his pursuits; and I would take the liberty to advise Dr. Hooker to spend a week or two on a visit to Hamburg, as Dr. Sonder can also give from my letters perhaps much acceptable information." (Hooker 1854). Mueller made good his promise to Joseph Hooker, as many specimens (not just Tasmanian) with associated plain grey labels (some noted as '*1853*') or plain blue labels (some noted as '*1857*') can be identified at K which derive from Mueller's herbarium. In some cases, the labels are in Mueller's hand but others appear to have written by his assistants (e.g. Carl Wilhelmi). Among the blue labelled specimens is K 000342392: *Agrostis venusta*, determined as *A. aemula* var. *pumila* Hook.f. and appearing in synonymy with *A. venusta* as a Mueller manuscript name in *Flora Tasmaniae* (Hooker 1858). It is assumed that this specimen, at least, was collected by C. Stuart. Despite the "more than a thousand species" of Stuart's in Sonder's herbarium, only 7% (less than 250) of the approximately 3000 Stuart collections at MEL, are readily identifiable as having been returned to Mueller in his acquisition of Sonder's herbarium.

Approximately half of Gunn's duplicates ex Sonder's herbarium are marked '*com. Lindley*' or '*mis. Lindley*' and therefore appear to have their origin from the duplicates Gunn sent Lindley during the mid 1830s. A further 20 Gunn collections at MEL (e.g. five sheets of Ranunculaceae) were provided to Mueller directly from Lindley.

Although most of Steetz's sheets give no indication as to how he obtained the Gunn specimens, about 15% of them note that Friedrich Ernest Lieboldt (1804–1864) of Kiel had first acquired them from England in 1844 ("Ex Anglia attulit Leiboldt, emi 1844") and a few others note that his friend Joseph Bernard Zuccarini (1797–1848) of Munich has received them from Hooker in the same year ("misit cl. Hooker det amicus cl. Zuccarini 1844"). This was also the year that George Bentham received Gunn duplicates from Hooker (see above, under '*The Munro duplicates*'). Steetz exchanged plant samples with many fellow botanists around the world, including Joseph Hooker and Bentham (Short & Sinkora 1988) and it is probable that many of Gunn's unsourced collections came directly from K during the 1850s. A few collections also indicate that Steetz received them from John Lindley.

The Orchidaceae (57 sheets) is the largest representative of monocotyledonous families collected by Gunn at MEL but rather than arriving via Sonder or Steez, were largely donated by NSW in 1949. Likewise, and despite the size and breadth of the Sonder and

Steetz acquisitions, there are also no Gunn Poaceae collections among them.

There are only eight Gunn grass specimens among the MEL collections, including four Agrostid grasses: *Deyeuxia quadriseta* (*Gunn 991*) ex HO, *D. scaberula* (*Gunn 1462*) and *Lachnagrostis filiformis* (*Gunn 1447*) ex NSW and *Lachnagrostis rudis* (*Gunn 1005?*). The source of the *L. rudis* specimen is unknown, with no indication of a donating herbarium. Although collected in 1838, it has the post 1871 label of the 'Phytological Museum of Melbourne, Baron Ferd. von Mueller, PH. & M.D', which suggests a relatively late acquisition, perhaps from Bentham as part of the exchange of material in preparation for *Flora Australiensis* (Bentham 1878; Lucas 2003). Mueller appears to have sent two sets of loans of his MEL 'Gramineae' to Bentham as indicated by his letters of 26 September 1874 and 28 November 1876 to Bentham (Mueller Corres. 2019). There are many grass specimens at K with Bentham written labels indicating that they were received from Mueller in 1877 (e.g. K 000838408: *Deyeuxia minor*, Benth. South Port, C. Stuart). On 12 December 1877, Bentham notified Mueller that he was returning the last of his specimens (Mueller Corres. 2019), including the grasses, and it may have been with these that Bentham sent him Gunn's *L. rudis*. The handwriting *'Agrostis aequata Nees With Agropyr. scabrum. 18/1/1838. R. Gunn.'* on the label is Mueller's, with a later hand adding '1843' after '*Nees*' (indicating the date of publication for the name) and '(No.1005?)' between *'18/1/1838'* and *'R. Gunn'*. Part of this collection was sent by Mueller, with an almost identical label (but with '*Tasmania*' instead of *'With Agropyr. scabrum'* and no additional text), to Eduard Hackel at St. Pölten and is now lodged at W (W 1916-0026741). The associated specimen of *'Agropry. scabrum'* (syn. *Anthosachne scabra* (R.Br.) Nevski.) has not be found to date.

Of the four non-Agrostid Gunn-collected grasses at MEL, that of *Australopyrum velutinum* (MEL 1560517) has a label stamped 'leg. R. Gunn' plus Milligan's handwriting and his coll. no. *173*, collected from Middlesex Plains and is therefore a duplicate of K 000702067 and NSW 931351 (see above, under '*James Backhouse and Joseph Milligan*'). A sheet of *Rytidosperma pauciflorum* (MEL 2139912A: Mt Wellington, *Gunn 1458*) is of two small tussocks ex NSW herbarium, while the remaining sheets are floret fragments of *R. caespitosum* (MEL 2125873A) and *R. setaceum* (MEL 2125971A). These last two sheets appear to have their origin from collections at K, sent to MEL by C.E. Hubbard in 1934. For example, K 000715652–K 000715653 has a written note by Hubbard, relating to K 000715653 (*'Gunn 1456, Danthonia subulata*, Penquite, 7/12/1844'), dated 14.iii.1934, "Part of type removed to another sheet & sent on loan to Melbourne" [i.e. MEL 2125971A]. The fragments were obviously removed from the loaned specimens before their return to Hubbard and being databased as K 000715655.

Pringle in Vermont: Cyrus Pringle (1838–1911) was a botanical explorer who spent 35 years cataloguing the flora of North America and collecting for the Smithsonian Institute and Asa Gray (Davis 1936). In 1902, Pringle was granted the entire top floor of the Williams Science Hall at the University of Vermont in which to house his herbarium of approximately 40,000 specimens. The herbarium became the property of the University but under Pringle's charge and control for his lifetime. At his death, the herbarium consisted of 155,000 sheets. He exchanged some 550,000 plant specimens with botanists around the world, including Joseph Maiden (1859–1925) at the New South Wales Herbarium in about 1910. Among the thousands of specimens Maiden sent to Pringle, were many duplicates of Gunn's collections from Tasmania. Of the eight grass collections ex Gunn were specimens of *Agrostis venusta*, *Deyeuxia quadriseta* and *Pentapogon quadrifidus*.

Hance in Hong Kong: Henry Fletcher Hance (1827–1886) was British Vice Consul at Whampoa (Huang-pu), Canton and Amoy (Hsia-men), China from 1844–1886. After a trip to England in 1851–1852, where he met the Hookers, he became their main correspondent in China and supplier of Chinese plant specimens (Fan 2004). Although his official duties prevented him from undertaking much field work, Hance established a large network of plant collectors and exchanged correspondence and plants for comparison with botanists across the world (e.g. there are at least 216 Hance collections at K (KHC 2021), 337 at P (MNHN 2020) and 165 at MEL (AVH 2021). His herbarium of over 22,000 plants was acquired by BM after his death. The only Gunn Agrostid grass collection ex Hance's herbarium that could be found in the current study was of *Deyeuxia quadriseta* (BM 001209653) but does not indicate its source. The label details are probably

in Hance's hand (or more likely in his wife's hand (Fan 2004)), with no Gunn number noted but with '(J.D.H.)' indicated as the probable determiner of the specimen. Most likely, Hance could have received the specimen from Hooker during his 1851–1852 visit to Kew, which was the same time that Hooker supplied Munro with the "huge collection of duplicates"(see above, under '*The Munro duplicates*'). However, the specimen may have come to Hance during Bentham's preparation of the *Flora Hongkongensis* (Bentham 1861) as Hance had considerable input into the publication. As Bentham also acknowledges Col. Munro for "the determination of all the Gramineae of the island, with numerous important communications on their generic arrangement and characters", the specimen may have been sent by Munro ex Hooker to Hance in order to ascertain if any like-taxa occurred in Hong Kong. Bentham (1861) notes under the genus *Sporobolus* R.Br.: "...differing but little from *Agrostis* and *Vilfa*." and that *S. indicus* R.Br. (syn. *S. africanus* (Poir.) Robyns & Tournay) (with a similarly congested, though narrower, spike-like panicle) is "Common on roadsides, Hance and others.". Then again, the specimen could have come to Hance during the 1870s from Hackel's duplicate ex Bentham (see above, under '*The John Lindley duplicates*'). For example, Hackel once sent Hance a specimen of *Dimeria sinensis* Rendle (BM 000959792) for comparison with his own collections.

Identifying type specimens

Although many of Gunn's duplicates from the 1837 and 1846 consignments can be identified with particular field samplings by Gunn, none of the sheets in the 'post-Hooker (1860)' sets, bear an indication of the date or location of the collections.

Investigating the 'post-Hooker (1860)' exsiccatae for type specimens: Examination of the Agrostid grass sheets (or images of them) across the 'post-Hooker (1860)' sets, show that not all the sets have a complete complement of taxa, those labelled as the same taxon across sets are not always identical in form, many sheets have a mixture of taxon forms and in a few cases, an individual sheet is comprised of a mixture of taxa (App. 1D). It is evident that Joseph or his assistants drew their material from a range of Gunn collections. Therefore, most of the sheets should be regarded as 'examples' of a Gunn collected taxon, rather than being duplicates of one particular collection. It is possible that some of the 'missing' earliest material from Gunn's collections make up part of these sets but there is no way of conclusively proving this. In some cases, individual specimens bear strong resemblance to Gunn collections at K (e.g. *Lachnagrostis filiformis* on the GH nd09, GH nd21 and NY nd07 sheets to K 000607839; *Agrostis parviflora* on the GH nd22, NY nd03, NY nd08 and OXF 00162500 sheets to K 000838280(b)) and even though attempts to match the exsiccatae with K collections have been made (see Notes App. 1D), without detailed morphological or genetic assessment, their status as duplicates remains uncertain.

As Hooker considered *Lachnagrostis filiformis* and *L. aemula* to be the same taxon, both species, including various forms of each were included, and often mixed, on individual sheets, in *'Agrostis aemula'* of the exsiccatae. In the case of *L. billardierei*, the solitary known Gunn collection (Sand Neck, Circular Head, 8.i.1838, *Gunn 1007*) was probably used to represent *'Agrostis billardierii'* in the sets, but only in a few cases (i.e. GH nd11 in part, P 02650854, P 03228341 in part, TCD 0018324 and W nd10) (App. 1D). Instead, the fine-leaved specimens of either the 9.xii.1844 *Gunn 592* (noted as *Gunn 592/1* on K 000838253) from Penquite, the 15.xi.1840 *Gunn 1446* from New Norfolk or an earlier, currently unlocated collection, that represented Hooker's *Agrostis billardieri* var. *ß setifolia* (syn. *Lachnagrostis semibarbata* var. *semibarbata*) were chosen as the examples for the species. Even where the typical variety was sent in these sets, they were accompanied by Hooker's var. *setifolia* but only marked on the labels as '*Agrostis billardierii ß* Br.› Only in the case of *'A. aequata'* (syn. *L. rudis*), with a single known collection (18.i.1838, *Gunn 1005*), is it possible to regard all examples of the exsiccatae as almost certain duplicates.

Agrostid grass names and types among Gunn collections: Brown (2019a) noted that the names *Agrostis gunnii* Hook.f., *Trichodium gunnii* Hook.f. and *Lachnagrostis willdenowii* Nees were written on a few Gunn sheets of *A. venusta* but these names were never formally published. Likewise, the name '*Deyeuxia ambigua* H.f.' was written on labels of *D. monticola* (K 000342413 and K 000342414), '*D. scaberula* H.f.' was written on sheets of *D. scaberula* Vickery (K 000838402) and *D. frigida* (K 000342407, K 000342409, K 000342410),

'*T. parviflora ß*' (presumably for *Trichodium*) was pencilled on a label for *Agrostis parviflora* (K 000607850) and *Dichelachne puberula* was written by Veldkamp on a sheet of *Dichelachne sieberiana* (P 00640973: Fig. 8b) but none were ever published.

Typification

Based on the current investigation, published names and type specimens among Gunn's, Everett's and Lawrence's Agrostid grass collections are confirmed or identified as follows:

***Agrostis aequata* Nees (1843).** Type: Van Diemen's Land [Circular Head, Tasmania], 18.i.1838, *R.Gunn 1005* (lectotype, designated by J.W.Vickery, *Contr. New South Wales Natl Herb.* 1(3): 106 (1941): CGE 05050!; isolectotypes: E 00886057!, G 00412131! (Fig. 7), GH nd03!, HO 35754!, HO 39274!, K 000838269!, K 000838270!, MEL 2273954A!, NSW 546292!, NSW 546295!, W 1916-0026741!. Probable isolectotypes: C 10022009!, CGE 34008!, CGE34009! in part (one specimen in centre of sheet of mixed *Lachnagrostis aemula* and *L. filiformis*), CGE nd03!, E 00680912!, G 00412128!, G 00412129!, GH nd10!, GOET 022975!, L 0043515!, M 0296261!, P 02650835!, P 03639281!, S 05-9040!, TCD 0018326!, TCD 0018330! in part (right hand specimen), W 0026797!, W 1886-0007671!, W 1889-0098330!, ZT 00194824!).

Note: Vickery (1941) cited the type of this name as "Tasmania: Gunn 1005, 18.1.1838 (Type. C.; type number, K.)" (where 'C' was used prior to the establishment of CGE as the herbarium code for the University of Cambridge Herbarium). As Vickery's citation meets the relevant requirements of ICN Art. 7.11, this is here treated as effective lectotypification.

As there is only one known gathering of this taxon by Gunn (or one of his collectors), the K specimens, along with those at E, G, GH, HO, MEL, NSW and W are here recognised as isolectotypes. The specimens noted here as probable isolectotypes are mainly those deriving from Kew's 'post-Hooker (1860)' distribution of Tasmanian specimens throughout Europe. These specimens, while likely to be, or that contain, remnants of Gunn's *1005* collection, could have been supplemented with additional material from other sources. Nevertheless, the 100-odd inflorescences of *L. rudis*, totalled across all the herbarium sheets (at least 30 inflorescences at HO and 10 at K), is not an excessive gathering to be attributed to one collection (i.e. *Gunn 1005* on 18.i.1838). For example, the taxon has been collected in SW Victoria, from populations "in millions" following fire (Robert Bates 2014, pers. comm., 28 February).

Details of isolectotypes and probable isolectotypes bearing an 'nd' (not databased) number are noted in Appendix 1.

This name is currently treated as a synonym of *Lachnagrostis rudis* (Roem. & Schult.) Trin.

***Agrostis billardierei* var. *setifolia* Hook.f. (1858)**; *Agrostis aemula* var. *setifolia* (Hook.f.) Vickery (1941). Type: New Norfolk [Tasmania], 15.xi.1840, *R.Gunn 1446* (lectotype, designated by J.W.Vickery, *Contr. New South Wales Natl Herb.* 1(3): 116 (1941): K 000838251–52! in part (excluding the top right-hand element); isolectotype: HO 35753!. Possible isolectotypes: C 10022103!, G 00412137!, GH nd11! in part, GOET 022977!, L 1206060!, M 0296275!, OXF 00163935!, P 02650855!, P 03228341! in part (one specimen 2nd from left of sheet, mixed with *Deyeuxia scaberula*, *Lachnagrostis aemula* and *L. billardierei*), P 02650865!, TCD 0018324! in part (mid-left and right-hand side specimens), W 1886-0007672!, W 1889-0098325! in part (one specimen 2nd from left of sheet, mixed with *L. filiformis*), ZT 00194825!).

Note: Vickery (1941) cited the type of this name as "Tasmania: New Norfolk, Gunn, No. 1446, 15.11.1840 (Type. K.)". As Vickery's citation meets the relevant requirements of ICN Art. 7.11, this is here treated as effective lectotypification.

The possible isolectotypes noted here are part of the 'post-Hooker (1860)' exsiccatae. See Brown (2019b) for further details concerning Vickery's choice of the lectotype.

Details of GH nd11 (not databased, number 11) are noted in Appendix 1.

The current name for this taxon is *Lachnagrostis semibarbata* (Trin.) A.J.Br. var. *semibarbata*.

***Agrostis diaphora* Trin. (1841).** Type: Van Diemens Land. (Hooker. Lindley.) [Tasmania], *s. dat., leg. ign.* [probably Cornfields, Formosa, 1832, *R.W.Lawrence 57*] (lectotype [first step], designated by J.W.Vickery, *Contr. New South Wales Natl. Herb.* 1(2), 51 (1940): LE TRIN; lectotype [second step], designated here: LE TRIN–

Figure 8. P 00640973: an example of the post-Hooker (1860) distribution of Ronald Gunn duplicate collections. **a**. standard 'Ex. Herb. Hook.' label for *Dichelachne sciurea* (syn. *D. sieberiana*, *D. rara* subsp. *asperula*). **b**. Herb. Mus. Paris label indicating the specimen as a donation from Sir William Hooker in 1863. Image accessed from http://mediaphoto.mnhn.fr/media/1443327594585x8gPOYPMVsX2lzYK

1602.1! (V.D.L.23). Probable isolectotypes: HO 130804! (*RWL 57*, *771*: Fig. 4), K 000838419! in part (right-hand specimen of three culms and panicles: *Gunn 771*), W 0026799! in part (left-hand specimen: *Lawrence 57*: Fig. 3b); remaining syntypes: LE TRIN–1602.2! in part (left-hand specimen), W 0026798!, W 0026799! in part (right-hand specimen: *Gunn 587*: Fig. 3a), LE TRIN–1602.2! in part (right-hand specimen: V.D.L.).

Note: Vickery (1940) cited the type of this name as "Van Diemen's Land, ex herb. of Trinius. Type of *A. diaphora* Trin. at Herb. Acad. Sci. Petropol.):". As Vickery's citation meets the relevant requirements of ICN Art. 7.11, this is here treated as effective (first-step) lectotypification."

The second-step lectotype was selected from a group of syntypes annotated '*Agrostis diaphora* m.', including W 0026798 which is considered here to be a duplicate of the *Gunn 991* collection of 11.i.1837. Trinius's (1841) description encompasses *Gunn 771* = *Lawrence 57* (emerging & emerged panicles) and *Gunn 587* (mature panicles). See '*Saint Petersburg collections*' above for details concerning sources of the HO, K, LE TRIN and W specimens.

Weiller et al. (2009b) considered that Vickery (1940) had designated "Van Diemen's Land [Tas.], *C.Stuart*, ex Herb. Trinius" as the lectotype for *Deyeuxia diaphora*. However, "C. Stuart", in Vickery's list of Tasmanian specimens, is separated by a semicolon from "Van Diemen's Land, ex herb. of Trinius", indicating that the two entries were considered by her to be separate collections.

As Vickery determined and annotated at least the right-hand specimen of LE TRIN–1602.2 and the specimens of LE TRIN–1602.1 as *'D. quadriseta (Labill.) Benth.'* in 1938, her type citation does not meet the requirements of the ICN Art. 9.3 "A lectotype is one specimen or illustration designated from the original material as the nomenclatural type ...." (ICN 2017).

Vickery (1940) noted the type of *A. diaphora* in her list of "closely allied specimens" under Form *B* of *Deyeuxia quadriseta*. As she described this form as having anthers 1.2–1.5 mm long, she may have been referring to the right-hand specimen on LE TRIN–1602.2, which has an associated sketch showing relatively long anthers (estimated to be 1.1 mm), in contrast to the sketch on LE TRIN–1602.1, which shows smaller anthers (estimated to be 0.6 mm). Anthers were not included in the sketch for the left-hand side specimen of LE TRIN–1602.2. However, as the anthers of the specimens at W (the assumed source of the LE TRIN duplicates) have not been measured and the anther lengths on the specimens at LE TRIN are only assumed from the associated sketches, such a character cannot provide a definitive choice of a lectotype.

In July 1939, C.E. Hubbard annotated two of the panicles of the right-hand specimen of K 000838419 with "2 specimens labelled *Agrostis diaphora* Trin. & part of type from Leningrad (V.D.L.23)". LE TRIN–1602.1 is designated here as the lectotype as it most likely represents the collection which Hubbard was referring to. There is no obstacle in doing so, as ICN Art. 9.4 states that "original material comprises the following elements: *(a)* those specimens and illustrations (both unpublished and published prior to publication of the protologue) that the author associated with the taxon ...." (ICN 2017).

From her morphological description, Vickery (1940) appears to have cited the left-hand specimen on LE TRIN–1602.2 as an example of her Form *G* of *D. quadriseta*, noting it as "Van Diemen's Land ex herb. of Trinius (included with type of *A. diaphora* Trin.)". However, her Form *G* is based on several specimens with anthers 1.7–2 mm long but with a broad range of panicle characters, including *Gunn 991* (K 000342405–06) with its generally narrow, slightly lobed panicles, *Gunn 1489* (K 000342404) with its broad, lobed panicles and sometimes reflexed lower branches, *Gunn 1447* (K 000342417) with its rather long and lobed panicles. She also included in Form *G*, Hooker's *A. quadriseta* var. *paniculata* ("l.c." or loco citato [i.e. based on Hooker's description]).

Vickery (1940) included *Gunn 771* as part of her Form *H* (with anthers "about 0.7 mm long"), probably based on the unnumbered, robust specimen on the left hand side of sheet K 000838419, rather than the right-hand specimens annotated by Hubbard. The current study suggests that the larger, lobed, panicle on K 000838419 is a duplicate of *Gunn 990* (see below under *Agrostis lobata*).

The current name for this taxon is *Deyeuxia quadriseta* (Labill.) Benth.

***Agrostis intricata* Nees (1843).** Type: Insulae van Diemen, Hampstead Hills [Tasmania], ii.1837, *R.Gunn 1011* in part (lectotype, designated here: CGE 05051!;

isolectotypes: E 00680897!, K 000838277! (Fig. 1), K 000913425! in part (central specimen)).

Note: This taxon was originally gathered with *Deyeuxia gunniana* (syn. *Echinopogon gunnianus*) as part of a mixed collection. As the CGE syntype was the only specimen labelled by Nees von Esenbeck, it is designated as the lectotype.

The current name for this taxon is *Agrostis parviflora* R.Br.

***Agrostis lobata* R.Br. (1810)**; *Bromidium lobatum* (R.Br.) Nees (1843); *Agrostis quadriseta* var. *lobata* Hook.f. (1858). Type: Port Dalrymple [Tasmania], i.1804, *R.Brown 6216* (lectotype [first step], designated by J.W.Vickery, *Contr. New South Wales Natl. Herb.* 1(2), 52 (1940); lectotype [second step], designated here: BM 000906015!; isolectotypes: K 000838418!, LE TRIN–1619.1 *n.v.*).

Note: Vickery (1940) cited the type of this name as "Port Dalrymple, R. Brown, No. 6216". As Vickery's citation meets the relevant requirements of ICN Art. 7.11, this is here treated as effective (first-step) lectotypification.

Nees von Esenbeck (1843) noted three unnamed varieties for this species, based on Everett and Gunn collections: α: Van Diemens Land, 1838, *G.Everett s.n.* (CGE 34017! in part (upper left-hand specimen)); *ß1*: Insula Van Diemen, 25.xii.1837, *R.Gunn 990* (CGE 34015!); *ß2*: Insula Van Diemen, 25.xii.1837, *R.Gunn 991* (CGE 34017! in part (specimen on right-hand side with three culms and panicles).

The date cited by Nees von Esenbeck (1843) in his protologue to both his *ß1* and *ß2* varieties does not appear on the CGE sheets but was probably separately supplied to him by John Lindley, from whom he received the sheets for examination. This Christmas Day date of 25.xii.1837 has only been found elsewhere on the attached label to NSW 549202 but in combination with a date of 8.i.1838. The date of 8.1.1838 appears on a collection of *Lachnagrostis billardierei* made for Robert Gunn (*Gunn 1007*) by Charlotte Smith ('CS' appearing on the label for the NSW duplicate of this collection), along with a range of other plants (e.g. *Poa labillardierei*, *Juncus caespiticius*, *Carex fascicularis*, *Leptinella longipes*).

Hooker (1858), in citing *Gunn 990*, equated Nees von Esenbeck's var. *ß1* with his "*Agrostis quadriseta* var. α *lobata*". As CGE 34015 is the only labelled collection of *Gunn 990* and there is no evidence that Hooker examined any of the Lindley or Everett collections on which Nees von Esenbeck described his varieties of this taxon, he may have applied his name to *Gunn 990*, based on Nees description alone: "maius, panicula semipedali, valde lobata, foliis longioribus latioribus" [larger, panicle six inches high, very lobed, longer with wider leaves]. However, the specimen on the left-hand side of K 000838419 is morphologically similar to CGE 34015 and although no collection number or varietal name appears on the label, both specimens fit the descriptions given by Gunn (*ca.* 1830–1850) of "tall" and "very large" for his collection *990* (Table 3). As such, the K specimen may have lent support to Hooker's var. *lobata*.

An unnumbered Gunn collection of *Deyeuxia quadriseta* at Kew (K 000342403) consists of five elements (each with a single panicle), of which the two on the right-hand side of the sheet are annotated with 'BX' (possibly ßX) and the original label is annotated with '*Bromidium lobatum ß* Nees' in Joseph Hooker's writing. All the panicles of the collection are relatively short, narrow and hardly lobed and the leaves of the unmarked specimens are somewhat short and narrow to involute, while the annotated elements have generally longer, broader and flat leaves. It is possible that the sheet is comprised of two separate collections with the annotated elements being included in Hooker's interpretation (at least initially) of Nees von Esenbeck's var. *ß2*. The accompanying label is dated 11.i.1837 in pencil, and if correct, all (or at least the annotated elements) belong to *Gunn 991* from Circular Head.

The current name for this taxon, including Nees von Esenbeck's varieties, is *Deyeuxia quadriseta* (Labill.) Benth.

***Agrostis quadriseta* var. *montana* Hook.f. (1858).** Type: Hobart [Tasmania], 14.xii.1840, *R.Gunn, 991?* (lectotype, designated here: K 000342415!; isolectotype: NSW 549223!).

Note: Hooker (1858) described this variety as having involute-setaceous leaves. The only *Gunn 991* sheet at Kew with involute leaves is the designated lectotype. The lobed and interrupted panicles of this specimen also conform to Hooker's description. Although the original Gunn label associated with this specimen has the annotations '*991?*', 'awn basal' and 'Hobart 14/12/40' written in ink and '*Ag. 4-seta*' (presumably for *Agrostis*

quadriseta) written in pencil, it was determined as *Deyeuxia monticola* (Roem. & Schult.) Vickery (syn. *A. montana* R.Br. nom. illeg., non Krocker (1787)) by Vickery when she visited Kew in 1938 (det. slip not dated).

Hooker (1858) regarded *A. montana* R.Br. as a separate taxon to his *A. quadriseta* var. *montana*. He cited *Gunn 1479* as his Tasmanian example of *A. montana*, and described the species as having smaller and more slender panicles than *A. quadriseta*, with "glumes no longer than the flower [i.e. floret], and there is a villous setula [i.e. rachilla extension] at the base of the latter". Vickery (1940) noted that "Hobart, Gunn 14.12.1840, No. 991? in part" is tall at 120 cm high (usually 10–70 cm) and has panicles to 25 cm long (usually 5–15 cm), which is probably why Hooker didn't recognise it as *A. montana*. With respect to the presence of a rachilla extension, Vickery (1940) described *D. monticola* with "rachilla very variously produced to form a bristle sometimes short and glabrous, sometimes longer bearing long hairs…".

Collections from the 'post-Hooker (1860)' sets of *D. monticola* were sent to GH, P and TCD (App. 1D) with the label '*Agrostis montana* H.f.', indicating that they were meant as examples of Hooker's variety, rather than as examples of *A. montana* R.Br. However, these specimens, although showing involute leaves, have only partially interrupted panicles of up to about 13 cm long and better conform to K 000342413 (the specimen used for Plate CLXA of *A. montana* R.Br. in Hooker (1858)).

The current name for this taxon is *Deyeuxia monticola* (Roem. & Schult.) Vickery.

***Agrostis quadriseta* var. *paniculata* Hook.f. (1858).** Type: Tasmania, *R.Gunn 991*.

Note: As for var. *montana*, Hooker (1858) did not cite a type for this name. Hooker's description of this variety, being of tall, erect habit, with rather short leaves and of pyramidal panicles with lower whorled branches with a tendency to reflex, does not conform to any currently known specimens of *Gunn 991*, including that labelled by L. Pignotti on the 12.iii.2010 (W 1916-0036837) as an isotype. As a consequence, it seems unwise at this time to select a lectotype. Although Hooker's description better fits *Gunn 1479* (K 000342416) and *Gunn 1489* (K 000342404), *Gunn 991* is cited in the protologue, thereby comprising original material and the designation of a lectotype cannot be in serious conflict with it (Brendan Lepschi 2022, pers. comm., 10 February). ICN Art. 9.1, Note 1 states that "Any designation of the type made by the original author, if definitely expressed at the time of the original publication of the name of the taxon, is final."

Hooker (1858), faced with "An extremely variable and very common grass, presenting no constant characters by which the above-defined varieties may be always known from one another" also stated that "I have examined a vast number of Australian, New Zealand, and Tasmanian specimens of this most variable Grass, vainly trying to divide them into species or constant varieties." Gunn (*ca.* 1830–1850) noted that four varieties of *Bromidium lobatum* had been described, apart from *Agrostis quadriseta* (Table 3), probably in reference to Nees von Esenbeck's (1843) notes (see under '*Agrostis lobata* R.Br. (1810)' above) and he used a range of taxon numbers for *A. quadriseta*/*B. lobatum*, including *771*, *990*, *991*, *991?*, *1447*, *1479* and *1489*, in probable response to this variation. As Hooker, cited *Gunn 990* for his var. *lobata* and *Gunn 991* for var. *montana*, he may have mistakenly re-cited *Gunn 991* for var. *paniculata*,

The current name for this taxon is *Deyeuxia quadriseta* (Labill.) Benth.

***Agrostis semibarbata* Trin. (1841).** Type: V.D.L. (Hooker) [Tasmania], *s. dat.*, *leg. ign.* (holotype: LE TRIN–1655.1! (V.D.L.6)).

Note: Original material of *Agrostis semibarbata* Trin. comprises a single sheet at LE (LE TRIN-1655.1), here regarded as the holotype. This specimen was erroneously treated as the "lectotype" by Brown (2019b). The source of this single specimen fragment is unknown and may no longer exist but is likely to derive from an early collection, or part collection, of R.W. Lawrence or R.C. Gunn, sent to Trinius in St. Petersburg from Glasgow University by William Hooker.

The current name for this taxon is *Lachnagrostis semibarbata* (Trin.) A.J.Br.

***Agrostis venusta* Trin. (1841).** Type: V.D.L. [Tasmania], *s. dat.*, *leg. ign.* [probably *Gunn 593*] (lectotype, designated here: LE TRIN–1666.1! in part (right-hand specimen: Fig. 4). Probable isolectotypes: CGE 340078!,

W 0025343!, K 000342391! in part (left-hand specimen: *Gunn 593*), K 000342393! in part (left-hand specimen with five or six small plants or part-plants: *Gunn 593*), LE TRIN–1666.1! in part (left-hand specimen: Fig. 4)).

Note: Examination of Gunn's Catalogue (*ca.* 1830–1850) indicates that *Gunn 593* was part of his 1835 plant collections consignment to William Hooker. As these early collections appear to have been meagre in quantity, material distributed as 'post-Hooker (1860)' is most likely to have derived from a later collection or multiple collections of *A. venusta* (e.g. *Gunn 1008* 2.xii.1837, 15.xi.1840, 18/25.xi.1840).

***Avena quadriseta* Labill. (1805)**; *Agrostis quadriseta* (Labill.) R.Br. (1810); *Bromidium quadrisetum* (Labill.) Nees (1843). Type: in capite Van-Diemen [Tasmania], 1792, *J.Labillardière s.n.* (holotype: FI 012384!).

Note: Although this name is not based on a Gunn collection, it is included here by way of clarification as it was cited by Gunn (*ca.* 1830–1850), Nees von Esenbeck (1843) and Hooker (1858).

Vickery (1940) listed the holotype as part of her Form *B* of *A. quadriseta*, noting "A specimen ex herb. Desfontaines in the Webb Herb. at Florence, which is probably part of the type collection of *Avena quadriseta* Labill., appears to belong to this form, but the spikelets show very few remaining lemmas and these are too old to contain anthers."

Although Edgar (1995) noted an isotype for Labillardière's collection in P (donated by Webb), the only imaged sheet of *Deyeuxia quadriseta* (as *Calamagrostis quadriseta* (Labill.) Spreng.) at MHMN (P 02651190) appears to have long geniculate awns exceeding the glumes by up to 3x their length. Unlike *Deyeuxia* and *Dichelachne*, the awn's bristle flexes well above the glume apices and is therefore more similar to an *Austrostipa* S.W.L.Jacobs & J.Everett.

Nees von Esenbeck (1843) noted an Everett specimen (probably CGE 33445) as representative of *B. quadrisetum*, even though it consists of a partly senesced small panicle only and is very similar to another Everett specimen (upper left-hand side of CGE 34017) which he labelled as *B. lobatum* and noted as var. α.

The current name for this taxon is *Deyeuxia quadriseta* (Labill.) Benth.

***Deyeuxia lawrencei* Vickery (1940).** Type: Van Diemen's Land [Tasmania], *ca.* 1831, *R.W.Lawrence 12* (holotype: K 000838424!; isotypes: NSW 501749! (fragment removed from holotype), LE TRIN–1619.1! (V.D.L.17)).

Note: The isotype in the LE TRIN herbarium was previously regarded as a possible isotype of *Agrostis lobata* by Soreng *et al.* (1996).

This taxon is currently presumed to be extinct (EPBC 2019).

***Deyeuxia scaberula* Vickery (1940)** Type: Base of Mount Wellington, [Hobart, Tasmania], 7.i.1841, *R.Gunn 1462* in part (lectotype, designated by J.W.Vickery, *Contr. New South Wales Natl. Herb.* 1(2), 64–65 (1940): K 000838402! in part (excluding packet of florets of other taxa mounted at bottom right, annotated by Vickery); isolectotypes: GH nd08!, MEL 2278938A!, NSW 549603!, NSW 549604!. Probable isolectotypes: C 10022109!, CGE 34018!, E 00680904!, G 00412138!, G 00412139!, GH nd15!, GH nd24!, GOET 0022979!, L 0044086!, NY nd05!, NY nd10!, P 02332986!, P 02651175!, P 03228398!, TCD 0018330! in part (excluding right-hand specimen), W nd14!; W 1886-0007675!, W 1889-0098324!).

Note: Vickery (1941) cited the type of this name as "Tasmania: Base of Mount Wellington, Gunn, no. 1462 in part, 7.1.1841 (Type. K. Figured in Hook. f. Fl. Tas. ii, 1860, Tab. CLXb)". As Vickery's citation meets the relevant requirements of ICN Art. 7.11, this is here treated as effective lectotypification.

The sheets designated here as probable isolectotypes are part of the 'post-Hooker (1860)' exsiccatae (labelled by Hooker as '*Agrostis scabra* Br.'). Although, it cannot be certain as to which of the three known Gunn collections of *D. scaberula* these specimens were derived, they bear a closer resemblance to the lectotype than to the other material. The collection from St. Patricks River (*Gunn 1461*, 1.iv.1845) appears to have consisted largely of *D. frigida* with only fragments of *D. scaberula* and the collection from North Huon River (*Gunn s.n.*, 15.i.1846) displays smaller plants with ascending (rather than erect) culms and very narrow, few-flowered panicles.

Details of isolectotypes and probable isolectotypes bearing an 'nd' (not databased) number are noted in Appendix 1.

***Dichelachne hookeriana* Trin. & Rupr. (1842)** Type: Terra Van Diemen (Hooker) [Tasmania], *s. dat.*, *R.Gunn 589* (lectotype [first step], designated by J.Veldkamp, *Blumea* 22(1): 10 (1975): LE; lectotype [second step], designated here: LE TRIN–1821b.1! in part (right-hand specimen annotated with 'b': labelled as Hooker 10 but probably *Gunn 589* in part). Probable isolectotype: BM *n.v.*, CGE nd05 in part (right-hand specimen: [*Gunn*] *589*), W 1997-0004384!. Remaining syntype: LE TRIN–1821b.1! in part (left-hand specimen annotated with 'a': labelled as Hooker 24 but probably Formosa near Cressy, 1830, *Lawrence 58* in part).

Note: Veldkamp (1975) cited the type of this name as "Type: *Hooker s.n.* (LE, holo, *n.v.*; BM, K)". This is here treated as effective (first step) lectotypification by Veldkamp. As Veldkamp's citation meets the relevant requirements of ICN Art. 7.11 for lectotypification, his use of the term "holo" is correctable under ICN Art. 9.10.

The isotypes cited by Veldkamp (1975) for BM and K cannot be found. The BM type material has been missing since 1975 (Norbert Holstein, 2022, pers. comm., 25 March).

Ruprecht separated material of *D. hookeriana* and *D. longiseta* from both collections sent to Trinius by Hooker as V.D.L.10 and V.D.L.24 and combined them into separate taxon sheets.

The current name for this taxon is *Dichelachne crinita* (L.f.) Hook.f.

***Dichelachne longiseta* Trin. & Rupr. (1842)** Type: Terra Van Diemen (Hooker) [Tasmania, probably Formosa near Cressy], 1830, *R.W.Lawrence 58* (lectotype [first step], designated by J.Veldkamp, *Blumea* 22(1): 10 (1975): LE; lectotype [second step], designated here: LE TRIN–1822.1! in part (left-hand inflorescence annotated with 'a': labelled as Hooker 24 but probably *Lawrence 58* in part). Probable isolectotypes: BM *n.v.*, HO 106445! (*RWL 58*), LE TRIN-1822.1 in part (Hooker ex W: frag. *n.v.* in envelope), NSW 550039! (*R.W.L.* [*Lawrence 58*]), W nd01! (V.D.L., *Lawrence 58*, ex Hook.). Remaining syntypes: HO 516919! (*Gunn 589*), K 000913404! (*Gunn 589*), K 000913405! (V.D.L.10: probably *Gunn 589* in part), LE TRIN–1822.1! in part (right-hand inflorescence labelled b: labelled as Hooker 10 but probably *Gunn 589* in part); possible remaining syntypes: K 000484084!, K 000484085!, K 000484086!, NSW 550031! ([*Gunn*] ~~*998*~~ *589*).

Note: Veldkamp (1975) cited "Type: *Hooker s.n.* (LE, holo, *n.v.*; BM, K)" as the type for *Dichelachne longiseta*. This is here treated as effective lectotypification by Veldkamp. As Veldkamp's citation meets the relevant requirements of ICN Art. 7.11, his use of the term "holo" is correctable under ICN Art. 9.10.

The BM isotype cited by Veldkamp (1975) has been missing since 1975 (Norbert Holstein, 2022, pers. comm., 25 March).

Ruprecht separated material of *D. hookeriana* and *D. longiseta* from both collections sent to Trinius by Hooker as V.D.L.10 and V.D.L.24 and combined such into separate taxon sheets.

Details of W nd01 (not databased, number 1) are noted in Appendix 1.

The current name for this taxon is *Dichelachne crinita* (L.f.) Hook.f.

***Dichelachne rara* subsp. *asperula* Veldkamp (1975).** Type: *s. loc.*, *s. dat.*, *R.Gunn 989* (holotype: L 0044115!; isotype: BM *n.v.* Probable isotypes: C 101122110!, GH nd18!, HO 130492!, K 000342388!, L 0044116!, M 0296258!, NSW 550510!, NSW 551042!, P 00640973! (Fig. 8), S 06-18158!, TCD 0018333!).

Note: The holotype is a 'post-Hooker (1860)' collection labelled *Dichelachne sciurea* and does not provide any collection details apart from the standard label that indicates it came from Gunn. Veldkamp (xi.1973) wrote on his determination "identical with Gunn 989", presumably in reference to L 0044116 which bears a Herb. Lugd. Batav. label with 'Gunn ?989, ..-12-1845, Penquite, Tasmania' printed on it. If L 0044116 is a true duplicate of L 004115, then it is probable that the remainder of the '*D. sciurea*' marked collections from the 'post-Hooker (1860)' distribution are also isotypes, excluding W 1997-04381 (determined by Edgar as *D. crinita*) and W 1997-04382 (which is probably a duplicate of a separate collection). All of these collections, plus those at HO and NSW, have the appearance of duplicates.

The BM isotype cited by Veldkamp (1975) has been missing since January 1975 (Norbert Holstein, 2019, pers. comm., 4 December).

Details of GH nd18 (not databased, number 18) are noted in Appendix 1.

Earlier collections of *Gunn 989*, included mixtures of *D. rara*, *D. crinita* and *Pentapogon quadrifidus* (Table 3,

App. 1). However, the collection of xii.1845 from Penquite is of pure *D. sieberiana*. Most of the dated duplicates are numbered as '*Gunn 989?*' (rather than '*Gunn 989*'), likely in recognition of their different appearance to other *Dichelachne*.

The current name for this taxon is *Dichelachne sieberiana* Trin. & Rupr.

***Echinopogon gunnianus* Nees (1843)** Type: Hampstead Hills, insulae Van Diemen [Tasmania], ii.1837, *R.Gunn 1011* in part (lectotype, designated here: CGE 05627!; isolectotype: K 000913425! in part (left and right-hand fragments)).

Note: This taxon was originally gathered with *Agrostis intricata* (syn. *A. parviflora*) as part of a mixed collection.

The current name for this taxon is *Deyeuxia gunniana* (Nees) Benth.

***Muhlenbergia mollicoma* Nees (1843)** Type: Insula Van Diemen [Tasmania], 8 & 11.i.1838, *Gunn 988* (lectotype, designated by J.Veldkamp, *Blumea* 22(1): 10 (1975): BM *n.v.*; isolectotypes: CGE 06274!, K 000913401! in part (excluding partial panicle on top left-hand side); W 1916-0026411!).

Note: Veldkamp (1975) cited the type of this name as "Type: *Gunn 988* (BM, holo; K, NSW)". This is here treated as effective lectotypification by Veldkamp. As Veldkamp's citation meets the relevant requirements of ICN Art. 7.11, his use of the term "holo" is correctable under ICN Art. 9.10.

There are no collection dates on the CGE and W sheets. Nees von Esenbeck (1843) mis-recorded one of the dates (i.e. 11.i.1838 instead of 11.i.1837), presumably provided by Lindley.

The only NSW specimen that can be found bearing '*Gunn 988*' has a label noting 'Hobart Town', '14. xii.1840' and determined as *D. inaequiglumis* (Hack. ex Cheeseman) Edgar & Connor. Recent examination of this specimen has redetermined it as *D. sieberiana*.

The current name for this taxon is *Dichelachne crinita* (L.f.) Hook.f.

***Muhlenbergia rara* var. *macrostachya* Nees (1843)** Type: Van Diemen's Land [Tasmania], 1838, *G. Everett, s.n.* (holotype: CGE 33443! in part (right-hand specimen)).

Note: A loose translation of Nees's Latin description of this taxon is "most spikelets with a bristle-like, very short, glabrous rachilla extension at base of the floret": a description seemingly applied to this variety to distinguish it from var. *rara*, for which he listed "Van Diemen's Land. 2 January 1838. *Gunn 989*. (ex parte).". Although the specimen of *D. rara* that Lindley must have provided to Nees von Esenbeck has not been located at CGE, duplicates at HO, K, W and P show a mixture of *D. crinita* and *D. rara*. Veldkamp (1975), although noting that rachilla extensions in the genus are "minute, rarely distinctly produced", does not discuss this character in his individual species descriptions. He placed *M. rara* var. *macrostachya* in synonymy with *D. rara* but included a question mark. Although Simon *et al.* (2009) also noted that Nees variety is "probably a synonym of *Dichelachne rara*.", they state that barren rachilla extensions are present for *D. sieberiana* and not present for *D. rara*. However, Edgar and Connor (1982) state that *D. rara* has an obvious rachilla extension up to 1 mm long and *D. sieberiana* has a rachilla prolongation to 0.5 mm long and Simon and Alfonso (2011) note that while *D. sieberiana* has a barren rachilla extension, *D. rara* may be with or without a rachilla extension. This uncertainty around the presence of a barren rachilla extension suggests that such a character is not a useful diagnostic tool.

Examination of the holotype shows the lemma to be subequal to or slightly shorter than the lower glume. This character, along with the rather condensed panicle and a lemma awn, which although geniculate, is not strongly bigeniculate, places the specimen within *D. rara*.

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Appendix 1. Agrostid grass collections and duplicates made by Ronald Campbell Gunn (incl. for Gunn by Charlotte Smith, Mary Ballantine and Charles Stuart), Robert William Lawrence, Joseph Milligan, George Everett Esq. and Joseph Hooker during the 1830s–1840s in Tasmania.

A. Gunn and Lawrence collections: 1831–1832 to 1835–1836 seasons.

First specimens of Gunn's 500 and 700 collection/taxon numbers, associated with Jul 1833, May 1835 and Nov 1836 consignments [Gunns Journal *ca.* 1830–1850); usually without location details and collection dates; often without collection/taxon numbers and with Lawrence's collections mixed with Gunn's collections or renumbered as Gunn's; includes specimens sent to Trinius at LE with Hooker's V.D.L. numbers.

Agrostis venusta: **K 000342393:** Van Diemen's Land, *s. dat.*, *Gunn 593*; conf. Brown 12.vi.2018; det. Munro as '*Agrostis*(*Trich.*)*venusta*'; ex Herb. Munro 1880; ex J.D. Hooker 1852; cit. Hooker (1858) & Vickery (1941) as *Gunn 592*; with *A. venusta:* K 000342394: Porongurup [W.A.], *s. dat.* [MEL dupl.: x.1867], *F. Mueller s.n.*; conf. Brown 12.vi.2018; det. Bentham; ex Herb. Mueller 1877 and *A. venusta:* K 000342395: Blackwood River [W.A.], [MEL dupl.: 1868], *Walcott s.n.*; conf. Brown 12.vi.2018; det. Bentham; ex Herb. Mueller 1877. **K 000342391:** Van Diemen's Land, *s. dat.*, *Gunn 593*; conf. Brown 12.vi.2018; det. Hooker [pencil on sheet]; ex Herb. Munro 1880; [ex J.D. Hooker 1852]; cit. Hooker (1858) [probably part of Munro coll. K 000342393]; with *A. venusta:* K 000342392: 'Dry places on Forest creek' [Tas.], *s. dat.*, [probable *C. Stuart* coll.]; conf. Brown 12.vi.2018; det. Bentham; det. Wilhelmi? as *A. aemula* var. *pumila*. **CGE 34007:** *s. loc.*, *s. dat.*, [*Gunn*] *593*; conf. Brown 11.ix.2019; det. Munro as '*Agrostis*(*Trichod:*)*venusta* Trin:' & *'Trichodium gunnii* Hook: Fil:'; ex Herb. Lindley 1866. **W 0025343:** V.D.L[d.], *s. dat.*, *Gunn 593*; det. Trinius as '*Agrostis venusta* m.'; ex Hook ['Naturhistorisches Museum Wein' retangular stamp]. **LE TRIN–1666.1(a)** [Fig. 4]**:** *s. loc.*, *s. dat.*, [*Gunn*]; det. Hubbard vii.1939; cit. Soreng et al. (1996) as holo of *A. venusta*; incl. pencil fig. with inked 'ex Familia gram. Vienn.' [ex W]. **LE TRIN–1666.1(b)** [Fig. 4]**:** V.D.L., *s. dat.*, [*Gunn*]; det. Trinius as '*Agr. venusta* m.'; incl. ink fig. [ex Herb. Hooker; incl. in Hubbard det. & Soreng cit.].

Deyeuxia lawrencei: **K 000838424**: *s. loc.*, c1831, *Lawrence s.n.*; marked 'V.D.L.12'; det. Vickery 8.vii.1938 & annot. "fragment removed for the National Herbarium, Sydney"; det. anon. as *Pentapogon*; annot. anon. [pencil] "circa 1831 from Hooker's letters"; cit. Vickery (1940) as Type [separated from *D. quadriseta:* K 000342404 post 1938]. **HO 128704**: photograph and photocopy of K 400083842. **NSW 501749**: Tasmania, c1831, *Lawrence 12*, det. Vickery 8.vii.1938 & annot. "fragment of the Type at Royal Botanic Gardens, Kew"; det. Jobson 21.vi.2013 as iso. **LE TRIN–1619.1**: V.D.L., *s. dat.*, [*Lawrence*]; marked 'V.D.L.17'; det. Brown 2018 from image; incl. ink fig.; cit. Soreng et al. (1996) as possible iso of *Agrostis lobata* [ex. Herb. Hooker; probable mis- or renumbering of *Lawrence 12* = V.D.L.12].

Deyeuxia quadriseta: **HO 130804** [Fig. 5]**:** Cornfields, Formosa, 1832, *Lawrence 57* [orig. spec. label]; det. anon.; label marked '*RWL 57 Agrostis quadriseta* Br & *Avena quadriseta* Labill.' [pencil] with addition of '*771*' by Gunn. **K 000838419(b):** [Tasmania], *s. dat.*, [*Gunn*] *771* [ex *Lawrence 57*]; two spec. annot. Hubbard vii.1939 "= 2 specimens labelled *Agrostis diaphora* Trin. & part of type from Leningrad. (V.D.L. 23)" [three RHS spec.]. **W 0026799(a)** [Fig. 3]**:** V.D.L[d.], *s. dat.*, *Lawrence 57*; det. Brown 18.v.2018; det. Pignotti 10.ix.2010 as probable iso of *A. diaphora* = *Calamagrostis quadriseta*; ex Hook ['Naturhistorisches Museum Wein' retangular stamp; LHS]. **LE TRIN–1602.1:** V.D.L., *s. dat.*, [*Lawrence*]; marked 'V.D.L.23'; det. Vickery 1938; det. Trinius as '*Agrostis diaphora* m.' on ink fig.; cit. Vickery (1940) as Form *B* in part and "Type of *A. diaphora* Trin. at Herb. Acad. Sci. Petropol."; cit. Soreng et al. (1996) as probable iso of *A. diaphora* [ex Herb. Hooker].

Deyeuxia quadriseta: **W 0026799(b)** [Fig. 3]**:** V.D.L[d.], *s. dat.*, *Gunn 587*; det. Brown 18.v.2018; det. Trinius as '*Agrostis diaphora* m.'; ex Hook ['Naturhistorisches Museum Wein' retangular stamp]. **LE TRIN–1602.2(a):** *s. loc.*, *s. dat.*, [*Gunn*]; det. Brown 2017 from image; incl. ink fig. marked '*Agrostis diaphora* m.' [LHS spec.; probably ex Herb. Hooker].

Deyeuxia quadriseta: **LE TRIN–1602.2(b):** V.D.L. [pencil], *s. dat.*, *leg. ign.*; det. Vickery 1938; det. Trinius as '*Agrostis diaphora* m.'; incl. pencil fig.; cit. Vickery (1940) as Form *B* in part and "Type of *A. diaphora* Trin. at Herb. Acad. Sci. Petropol."; cit. Soreng et al. (1996) as probable iso of *Agrostis diaphora* [RHS spec.; probably

ex W; possibly *Lawrence 57* but anthers larger in fig. compared to LE TRIN–1602.1 fig.].

Dichelachne crinita: **HO 106445:** probably Formosa (near Cressy), 1830, *Lawrence 58* [orig. spec. label]; det. anon.; label marked '*RWL 58 Agrostis crinita* Br.' [possible source of Hooker's V.D.L.24; flexuose awns]. **NSW 550039:** *s. loc, s. dat.*, [*Lawrence 58*] [orig. spec. label]; label marked '*R.W.L. 58*' and '*589*' [different pen & hand] and 'black joints as also No. 57'; det. anon as *Anthoxanthum crinitum/Agrostis crinita* [flexuose awns]. **W nd01:** V.D.L[d], *s. dat., Lawrence 58*; det. Edgar 8.iv.1982; det. Ruprecht as '*Dichelachne longiseta**' [two labels] and as '*Dichelachne longiseta**?' [one label]; ex Hook [flexuose awns] ['Herbarium Musei Caesar Palat. Vindobonensis' elongated octagonal stamp]. **LE TRIN–1822.1(a):** Van Diemen Land, *s. dat., Hook. N.24 p.p.*; det. Hubbard vii.1939; det. Ruprecht as *D. longiseta* [flexuose awns]. **LE TRIN–1822.1(c):** Van Diem., *s. dat.*, [*Lawrence*]; ex W; ex Herb. Hooker [frag. *n.v.* enclosed in envelope].

Dichelachne crinita: **LE TRIN–1821b.1(a):** V.D.L., *s. dat.*, [*Lawrence*]; marked 'V.D.L.24'; det. Brown 2017 from image; det. Hubbard vii.1939 as *D. hookeriana* [weakly geniculate awns].

Dichelachne crinita: **HO 516919:** Tasmania, *s. dat., Gunn ~~988~~* [Gunn's Herb. label], *Gunn 589* [HO label]; det. anon.; [flexuose awns]. **NSW 550031:** *s. loc., s. dat.*, [*Gunn*] *~~988~~ 589* [orig. spec. label], *~~589?~~ 'Muhlenbergia crinita ?'* [orig. spec. label], [*Gunn*] *~~988~~* [Gunn's Herb. label]; det. anon. [flexuose awns]. **K 000913404:** Van Diemen's Land, *s. dat., Gunn 589*; det. Veldkamp 1971 as *D. crinita* & probable iso of *D. longiseta*; det. Munro as *D. crinita* & *D. longiseta* [sheet]; det. Hooker? as *Agrostis crinita* [pencil]; ex Herb. Munro 1880; ex Herb. Hooker 1852; cit. Hooker (1858) [flexuose awns]. **K 000913405:** V.D.L. [Van Diemen's Land], *s. dat., leg. ign.*, marked "V.D.L.10"; det. Brown 27.vi.2018; det. Bentham [sheet]; det. Hooker? as *Agrostis crinita* [sheet]; one panicle of two annot. Hubbard vii.1939 "This matches the panicles on the type sheet of *D. longiseta* (*Hooker 24 p.p. & 10 p.p.*)" [flexuose awns]; with *D. crinita:* K 000913406: N. of Bathurst [N.S.W.], *s. dat., leg. ign.* [orig. spec. label]. **K 000484084:** *s. loc., s. dat., leg. ign.*; det. Munro as *D. crinita/D. vulgaris*; ex Herb. Bentham [flexuose awns; same sheet as K 000484085 & K 000484086; as there is no name or taxon number on any of these specimens, it is not certain they are Gunn's or all his, but the panicles are all very similar and probably derived from the same coll. plus the lack of detail suggests an early coll.]. **K 000484085:** Van Diemen's Land, *s. dat.*, [*Gunn*] [orig. spec. label]; det. Brown 2019 from image; det. anon. as '*Dichelachne rara* R.Br.? [ink]' and annot. as "habit of *Polypogon* but the glumes not awned"; ex Herb. Bentham; ex herb. Lindley [flexuose awns; same sheet as K 000484084 and K 0000484086]. **K 000484086:** V. Diemen's Land, *s. dat.*, [*Gunn*] [orig. spec. label]; det. Brown 2019 from image; det. anon. as '*Agrostis* [ink]'; det. Bentham as '*crinita* R.Br.? [pencil]'; ex Herb. Bentham; [ex Herb. Lemann]; ex Herb. Lindley 1849 [flexuose awns]; same sheet as K 000484084 and K 000484085]. **LE TRIN–1822.1(b):** Van Diemen Land, *s. dat., Hooker N.10 p.p.*; det. Hubbard vii.1939; det. Ruprecht as *D. longiseta* [flexuose awns]. **US 76266:** Van Diemen's Land, *s. dat., 589 Gunn*; det. Brown 2020 from image; det. anon. [pencil]; annot. anon. "Agrees with description of *D. hookeriana* Trin, Probably type coll." annot. anon. "*Agrostis crinita*", "E donno. amicuss. J.D. Hooker, 1852", "from herb. Munro" & "loaned from Kew Herb."; spec. obtained from European herbaria 1924; [fragments only; flexuose awns]. **US 865787:** Terra Van Diemen, *s. dat., Hooker s.n.* [probably Gunn]; det. Brown 2020 from image; det. anon. [pencil]; annot. anon. "*Dichelachne longiseta* Trin, "mss Trans. 1843 p5", "agrees with Trinius' inadequate description", "From herb. Munro" & "loaned by Kew Herb."; spec. obtained from European herbaria 1924; [fragments only; flexuose awns].

Dichelachne crinita: **CGE nd05(a):** *s. loc., s. dat.*, [*Gunn*] *589*; conf. Brown 11.ix.2019; det. Munro; ex Herb. Lindley 1866 [weakly geniculate awns] with *D. crinita:* CGE nd05(b): New Zealand, *s. dat., J.D. Hooker s.n.*; det. anon. **W 1997-0004384:** V.D.L[d], *s. dat., Gunn 589*; det. Edgar 8.iv.1982; det. Ruprecht as *D. hookeriana* – marked 'Ruprecht'; ex Hook [weakly geniculate awns; previously mounted with W 1997-0004385]. **LE TRIN–1821b.1(b):** V.D.L., *s. dat.*, [*Gunn*]; marked 'V.D.L.10'; det. Brown 2017 from image; det. Hubbard vii.1939 as *D. hookeriana*; det. Ruprecht as *Dichelachne*; incl. ink fig. [weakly geniculate awns].

Dichelachne rara: **W 1997-0004385:** V.D.L[d], *s. dat., Gunn 589*; det. Brown 19.iv.2018; det. Edgar 8.iv.1982 as *D. rara* subsp. *asperula*; det. Ruprecht as *D. hookeriana*; ex Hook; previously mounted with W 1997-0004384 [geniculate awns].

Echinopogon ovatus: **K 000342400:** V.D.L., 1833, *Lawrence 250* [orig. label]; det. Hooker [same sheet as K 000342401; single spec. partitioned to LHS by Hubbard? but more likely to be LHS and MID spec. as they appear identical]. **W nd02:** V.D.L[d]., *s. dat., Lawrence 250*; det. [Rechinger]; ex Hook [unstamped]

Echinopogon ovatus: **K 000342402:** Van Diemens Land, *s. dat., Gunn 590*; conf. Hubbard xii.1934; det. Munro [pencil on sheet]; det. Bentham; ex Herb. Bentham; ex Herb. Lindley 1838. **CGE 34002:** V. D. Land, *s. dat., Gunn 590*; det. Munro; ex Herb. Lindley 1866. **CGE 34001(a):** Insula Van Diemen, *s. dat., Gunn 590?*; det. Nees; ex Herb. Lindley 1866; cit. Nees (1843); with *E. ovatus*: CGE 34001(b): N. Holl., *s. dat., Brogden 96*; det. Nees as *E. ovatus*, *Agrostis ovata* & *Cinna ovata*. **W nd03:** V.D.L[d]., *s. dat., Gunn 590*; det. Trinius; ex Hook [unstamped]. **W nd04:** V.D.L., *s. dat.*, [*Gunn*]; det. Rechinger; ex Herb. Lindley 1839 [unstamped]. **E 00692038:** Van Diemen's Land,. *s. dat., Gunn 590*; conf. Brown 6.vi.2018; det. anon.; det anon. as *Agrostis ovata* and *Cinna ovata*; ex Herb. Kew; ex Herb. Munro 1880; ex J.D. Hooker 1852 [MID and RHS spec.]; with *E. ovatus:* E00692037(a): Swan River, WA, *s. dat., Drummond 348*; both conf. Brown 6.vi.2018 [two LHS spec. appear identical and conform to K 000913421 (incorrectly transcibed as *Drummond 342*), E 00692034(a) (LHS spec. only) and MEL 2279946A] and *E. ovatus:* E 00692037(b): Queensland "Common about Brisbane", *s. dat., Prentice & Boak* s.n. [appears to be text only without spec. – actual spec. may be E 00692034(b) (RHS spec.)]. **P 02218717:** Van Diemen, *s. dat., Gunn s.n.*; det. Brown 2.x.2019; det. anon. as *Cinna ovata* & *Agrostis ovata*; ex Herb. Lindley 1839. **NY 04206199:** New Holland, *s. dat. Gunn 590*; det. Brown 2020 from image; ex Herb. Columbia University; ex Herb. Bentham?; ex Herb. Lindley; critical notes by B.P.G. Hochreutiner, 1907, "Plant identical with Lindley no. 590 (fr.rk)", "at Hb. Kew", "and with ∞ specimens n. by various authors in Hb. Kew".

Lachnagrostis aemula: **LE TRIN–1584.6(a)**: V.D.L., *s. dat.*, [*Lawrence*]; marked 'V.D.L.7 (Hooker)'; det. Brown 2017 from image; attached to ink fig.; overlying two spec. of *L. filiformis:* LE TRIN–1584.6(b): *s. loc., s. dat., leg. ign.*; det. Brown 2017 from image; incl. separate pencil fig. [probably ex W]. **E 00680889(b)** [Fig. 6]: Van Diemen's Land, *s. dat., Lawrence 7*; det. Brown 5.vi.2018; det. anon. as *Deyeuxia billardieri*; ex Herb. Kew; ex Herb. Munro 1880; ex J.D. Hooker 1852 as '*No.7 Lawrence*' replacing '*No.1007*' and '*Gunn*' [three spec. with *L. billardierei*].

Lachnagrostis aemula: **CGE 34010(a)** [Fig. 2]**:** V. D. Land, *s. dat., Gunn 592*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *Agrostis aemula*; det. Munro as *Deyeuxia aemula*; ex Herb. Lindley 1866 [single leafless emerging inflorescence similar to *L. aemula:* CGE 34010(b)]; with *L. drummondiana:* CGE 34010(c): Vasse River on the South West coast of New Holland, 1839, *Mrs Molloy s.n.*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *Agrostis drummondiana*; det. Munro as *D. aemula*. **W nd05:** V.D.L[d]., *s. dat., Gunn 592*; det. Brown 19.iv.2018; det. Rechinger as *D. billardieri*; ex Hook [unstamped].

Lachnagrostis billardierei **subsp.** ***billardierei:*** **K 000342387**: Tasmania, *s. dat., Lawrence s.n.*; marked 'V.D.L.7'; det. Brown 12.vi.2018; det. Vickery 9.viii.1938 as *Agrostis billardieri*; det. Hooker? as *Deyeuxia billardieri.* **E 00680889(a)** [Fig. 6]: Van Diemen's Land, *s. dat., Lawrence 7*; det. Brown 5.vi.2018; det. anon. as *D. billardieri*; ex Herb. Kew; ex Herb. Munro 1880; ex J.D. Hooker 1852 as '*No.7 Lawrence*' replacing '*No.1007*' and '*Gunn*' [one spec. with *L. aemula*].

Lachnagrostis semibarbata var. ***semibarbata:*** LE TRIN–1655.1: V.D.L., *s. dat.*, [*Gunn* or *Lawrence*]; marked 'V.D.L.6'; det. Brown 2017 from image; incl. ink fig. marked '*A. semibarbata* m.'; det. Hubbard vii.1939 as *Agrostis aemula* var. *setifolia*; cit. Soreng et al. (1996) as holo of *A. semibarbata*.

B. Gunn and Everett collections: 1836–1837 and 1837–1838 seasons.

May 1838 consignment (Gunn consign. no. 1837); first specimens of Gunn's 900 and 1000 collection/taxon numbers; includes collections made by Charlotte Smith for Gunn and collections made by George Everett Esq. in 1838.

Agrostis parviflora: **K 000838277** [Fig. 1]**:** Emu River, Hampshire Hills, ii.1837, *Gunn 1011* [orig. spec. label]; det. Brown 19.x.2017; det. Hooker as *A. intricata*; det. anon. as *E. parviflora*; det. Jacobs 6.vi.1984 as iso of *A. intricata*; incl. fig.; cit. Hooker (1858) & Vickery (1941) in part [LHS and bottom RHS specs.; same sheet as *A. venusta:* K 000838278 & *A. parviflora:* K 000838279]. **K 000913425(b):** Tasmania, *s. dat., Gunn s.n.*; det. Hooker as *A. parviflora ß* [small specimen only, between frags. of *Deyeuxia gunniana*]. **CGE 05051:** V. D. Land, *s. dat., Gunn*

1011; conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; det. Nees as '*Agrostis intricata* Nees an [or] *A. vulgaris* var?'; det. Herb. Univ. Cantab. as Type of *A. intricata*; ex Herb. Lindley 1866; cit. Nees (1843) & Vickery (1941) as "Type of *Agrostis intricata* Nees. C.". **E 00680897:** Van Diemens Land, *s. dat.*, *Gunn 1011*; det. Brown 3.vii.2018; det. Munro [pencil]; ex Herb. Kew; ex Herb. Munro 1880.

Agrostis venusta: **K 000838272:** Tasmania, 2.xii.1837, *Gunn 1008* [orig. spec. label]; conf. Brown 19.x.2017; det. Hooker [sheet]; det. Hooker? as *'Agr. Gunnii Hf.'* [sheet; crossed out]; det. Hooker as *Lachnagrostis willdenowii* Nees; incl. fig. for Plate CLIXA; cit. Hooker (1858) [spec. LHS and MID; same sheet as K 000838273]. **K 000838273:** Tasmania, 2.xii.1837; *Gunn 1008* [orig. spec. label]; annot. Hubbard vii.1839 "This specimen represents the same species as the type of *Agrostis venusta* Trin. (hb. Leningrad)." [same sheet as K000838272]. **CGE 34005(a):** Insula Van Diemen, *s. dat.*, *Gunn 1008*; conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; ex Herb. Lindley 1866; cit. Vickery (1941) as "Type of *L. willdenowii* Nees at C" [see Brown 2019a].

Deyeuxia gunniana: **K 000913425(a):** Tasmania, *s. dat.*, *Gunn s.n.*; det. Bentham; det. Hooker as *Echinopogon gunnianus*; annot. Hooker "mixed with *A. parviflora*"; cit. Bentham (1878) as "much depauperated" & Vickery (1940) as "without exact locality" [frags. only - left and right-hand specimen packets]. **CGE 05627:** Hampstead [Hampshire Hills], ii.1837, *Gunn 1011*; conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; det. Nees as *E. gunnianus*; ex Herb. Lindley 1866; cit. Nees (1843), Bentham (1878) & Vickery (1940) as Type at C.

Deyeuxia quadriseta: **CGE 34015:** Insula Van Diemen, *s. dat.*, *Gunn 990*; det. Brown 11.ix.2019; det. Nees as *A. lobata* & *Bromidium lobatum*; ex Herb. Lindley 1866; cit. Nees (1843) as var. *ß1* and coll. date of 25.xii.1837. **CGE nd02(a):** V. Diemen's Land, *s. dat.*, *leg. ign.*; conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; det. anon. as *A. lobata* & *B. lobatum*; det. anon. as *A. lobata*; spec. label. marked '*A. lobata* No. 26'; ex Herb. Lemann 1852; ex Herb. Lindley 1849; [four spec. on RHS; if Gunn coll. then most like *Gunn 990*]. **K 000838419(a):** Tasmania, *s. dat.*, *Gunn s.n.* [spec. label without orig. details]; conf. Brown 27.vi.2018; det. Bentham; det. Hooker as *Agrostis quadriseta* [pencil on sheet]; annot. Hooker "awn basal, palea nearly smooth"; cit. Vickery (1940) as Form *H*, "Gunn. No. 771"; probable spec. cit. Hooker (1858) as "*Agrostis quadriseta* var. α. *lobata*" [one LHS spec.; probably *Gunn 990* based on morphology].

Deyeuxia quadriseta: **NSW 549203:** Neck Marsh [probably Circular Head], 11.i.1837, *Gunn 991* [Gunn's Herb. label]; det. anon. **K 000342403:** Tasmania, 11.i.1837 [pencil], *Gunn s.n.* [orig. spec. label]; conf. Brown 13.vi.2018; det. Bentham; det. Hooker? as *Agrostis quadriseta*; det. Hooker as *Bromidium lobatum ß* Nees; annot. Hooker "awn basal"; two spec. on RHS marked 'BX' [flat leaves and long–exserted inflorescences]; three unmarked spec. on LHS [narrow to involute leaves and emerging inflorescences and possibly separate collection]; probable spec. cit. Vickery (1940) as Form *E* in part [similar morphology to Vickery's co-citation of "Circular Head, F. Mueller": dupl. MEL 2130655A]. **CGE 34017(b):** Insula Van Diemen, *s. dat.*, *Gunn 991*; det. Brown 11.ix.2019; det. Nees as *B. lobatum* & *Agrostis lobata*; ex Herb. Lindley 1866; cit. Nees (1843) as var. *ß2* and for coll. date of 25.xii.1837 [spec. on RHS]. **CGE nd02(b):** V. Diemen's Land, *s. dat.*, *leg. ign.*; conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; det. anon. as *A. montana*; ex Herb. Lemann 1852; ex Herb. Lindley 1849; [four spec. on LHS; if Gunn coll. then most like *Gunn 991*]. **W 1916-0036837:** Van Diemen's Land, *s. dat.*, *Gunn 991* [pencil]; conf.. Brown 19.iv.2018; det. Bentham; crudely marked γ [pencil on sheet]; det. Munro as *A. lobata* & *B. lobatum* [pencil on sheet]; det. anon. as *A. lobata*; det. Pignotti 12.iii.2010 as iso of *A. quadriseta* var. *paniculata* = *Calamagrostis quadriseta*; ex Herb. Hackel 1916; ex Herb. Bentham; ex Herb. Lindley 1838. **W 0026798:** V.D.L., *s. dat.*, [*Gunn*]; det. Brown 19.vi.2018; det. Trinius as *Agrostis diaphora*; det. Pignotti 10.ix.2010 as syn of *A. diaphora* = *C. quadriseta*; ex Herb. Lindley 1839 ['Naturhistorisches Museum Wein' retangular stamp]. **P 02650873:** Van-Diemen, *s. dat.*, *Gunn s.n.*; det. Brown 2.x.2019; det. anon. as *A. montana*; ex Herb. Lindley 1839. **P 02650877:** Van-Diemen, *s. dat.*, *Gunn s.n.*; det. Brown 2.x.2019; det. anon. as *A. montana*; ex Herb. Lindley 1839. **G 00412142:** Terre de Van Diemen, *s. dat.*, [*Gunn*]; det. Boissnier? as *D. quadriseta* & *A. quadriseta*; ex Herb. Lindley 1839. **G 00412142a:** Terre de Van Diemen, *s. dat.*, [*Gunn*]; det. Boissnier? as *Agrostis*; ex Herb. Lindley 1839.

Deyeuxia quadriseta: **CGE 33445:** Van Diemen's Land, 1838, *Everett s.n.*; det. Brown 11.ix.2019; det. Nees as *Bromidium quadrisetum* & *Agrostis quadriseta*; ex Herb.

Lindley 1866; cit. Nees (1843) [one small panicle only, appearing morphologically similar to CGE 34017(a)]. **CGE 34017(a):** Van Diemen's Land, 1838, *Everett s.n.*; det. Brown 11.ix.2019; det. Nees as *B. lobatum* & *A. lobata*; ex Herb. Lindley 1866; cit. Nees (1843) as var. α [one small panicle only, upper LHS].

Deyeuxia quadriseta: **NSW 549202:** Neck [probably Circular Head], 25.xii.1837 & 8.i.1838, *Gunn 991* [orig. spec. label & Gunn's Herb. label]; det. anon.; spec. label marked '*Bromidium lobatum*' & 1837 consign. [probable date of 25.xii.1837 for coll., whereas date of 8.i.1838 may refer to the coll. by Charlotte Smith (NSW 549200) two weeks later as she made other coll. on this date].

Deyeuxia quadriseta: **NSW 549200**: *s. loc., s. dat., Smith s.n.* [Gunn's Herb. label]; det. anon.; coll. Charlotte Smith (CS) [one culm with a short panicle; probably coll. 8.i.1838].

Deyeuxia quadriseta: **NSW 549204:** Circular Head, 12.i.1838, *Gunn s.n.* [Gunn's Herb. label]; det. anon. **UVMVT 130288:** Tasmania, i.1838, *Gunn s.n.*; ex Herb. NSW; det. anon.

Dichelachne crinita: **NSW 550038 *n.v.*:** *s. loc.*, 1837, [*Gunn*] *988*; det. anon. **K 000913401:** *s. loc.*, 11.i.1837 & 8.i.1838, *Gunn ~~589?~~ 988* [orig. spec. label]; det. Veldkamp xi.1973; det. Bentham; det. Hooker as *Muhlenbergia mollicoma*; det. Veldkamp as iso of *M. mollicoma*; cit. Hooker (1858) [probably majority ex C. Smith coll. of 8.i.1838, while the more mature panicle towards the top LHS of the sheet may be a Gunn collection or contaminant from 11.i.1837]. **CGE 06274:** Insula Van Diemen, *s. dat., Gunn 988*; det. Brown 11.ix.2019; det. Nees as *M. mollicoma*; det. Herb. Univ. Catab. as Type of *M. mollicoma*; ex Herb. Lindley 1866; cit. Nees (1843). **W 1916-0026411:** Van Diemen's Land, *s. dat., Gunn 988*; det. Munro as *D. crinita* [ink] & *M. mollicoma* [pencil]; det. Pignotti 9.xii.2010 as iso of *M. mollicoma* = *D. crinita*; ex Herb. E. Hackel 1916; ex Herb. Bentham; ex Herb. Lindley 1838. **W nd06:** V.D.L., *s. dat.*, [*Gunn*]; det. Brown 19.iv.2018; det. Ruprecht as *D. hookeriana*; ex Herb. Lindley 1839 ['Herbarium Musei Caesar Palat. Vindobonensis' elongated octagonal stamp]. **P 03331856:** Van-Diemen, *s. dat., Gunn s.n.*; det. Hallé 18.v.1989; det. anon. as *D. hookeriana* & *Anthoxanthum crinitum*; ex Herb. Lindley 1839. **US 863882:** 'Vn Dieme Ln' [Van Diemens Land], *s. dat., Gunn 988* [orig. spec. blue label]; det. anon.; det. Bentham; det. Hooker as *Muhlenbergia mollicoma*; ex U.S. Dept. Ag., Div. Agrost., ex Herb. Hooker 1867.

Dichelachne crinita: **CGE 33444:** *s. loc.*, 1838, *Everett s.n.*; det. Brown 11.ix.2019; det. Nees as *Muhlenbergia crinita*; ex Herb. Lindley 1866; cit. Nees (1843) [one plant with a single emerging inflorescence].

Dichelachne crinita: **HO 128405(b):** Back Lagoon near Circular Head, 2.1.1838, *Gunn 989*; det. Brown 27.vi.2018 [two spec. with *D. rara*]. **K 000356725:** Tasmania, 2.i.1838, *Gunn 989* [orig. spec. label]; conf. Brown 27.vi.2018; det. Bentham; det. Hooker? as *'Dich. crinita'* [pencil]; det. Hooker as *Pentapogon billardieri* [six spec.; same sheet as *D. rara:* K 000342389].

Dichelachne rara: **HO 128405(a):** Back Lagoon near Circular Head, 2.i.1838, *Gunn 989* [orig. spec. label [pencil] & Gunn's Herb. label]; det. Morris 20.ii.1980; det. anon. as *D. sciurea*; spec. label marked '*Agrostis*' [six spec. with *D. crinita*]. **K 000342389:** Tasmania, 2.i.1838, *Gunn 989*; det. Brown 27.vi.2018 [one spec.; same sheet as *D. crinita:* K 000356725]. **CGE (**not found)**:** Van Diemen's Land, 2.I.1838, *Gunn 989*; cit. Nees (1843) as *Muhlenbergia rara* & ex parte.

***Dichelachne rara*: CGE 33443(b):** *s. loc.*, 1838, *Everett s.n.*; det. Brown 11.ix.2019; det. Nees as *Muhlenbergia rara ß* macrostachya; cit. Nees (1843).

Echinopogon ovatus: **K 000342401:** C.H[d.] [Circular Head], xii [1837], *Gunn 590?* [orig. spec. label]; conf. Hubbard xii.1934; det. Hooker; cit. Hooker (1858) [same sheet as K 000342400; MID and RHS spec. partitioned by Hubbard? but probably should be RHS spec. only].

Lachnagrostis aemula: **K 000607849:** Tasmania, 11.xii.1837, *Gunn 1006* [orig. label]; det. Brown 7.vi.2018; det. Vickery 11.viii.1938 as *Agrostis aemula*; det. Hooker? as *'Billard.'* [pencil]; det. Hooker? as *Deyeuxia forsteri*; det. Hooker as *L. aemula* [crossed out]; cit. Hooker (1858) & Vickery (1941). **CGE 34011:** Insula Van Diemen, *s. dat., Gunn 1006*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *A. aemula*; det. Nees as *Lasiagrostis aemula*; ex Herb. Lindley 1866; cit. Nees (1843). **CGE 34013(b)**: V. Diemen's Land, *s. dat., Gunn s.n.*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *Agrostis aemula*; det. anon. as *D. billardieri* [sheet]; det. anon. as *A. aemula* & *D. aemula* [pencil]; ex Herb. Lemann 1852; ex Herb. Lindley [one spec. with *L. billardierei*]. **CGE nd01:** V. Diemen's Land, *s. dat.*, [*Gunn*]; det. Brown 11.ix.2019; det. anon. as '*Agrostis aemula* Br.'; det. anon. as '(2)

A. aemula Br.' & '(1) *D. ~~billardieri~~* Kunth. *aemula*'; spec. label marked '*A. ~~billardieri~~* No.13' [LHS spec.]; ex Herb. Lemann 1852; ex Herb. Lindley 1849. **E 00886056:** Insula Van Diemen, *s. dat.*, *Gunn 1006*; det. Brown 5.vi.2018; det. Walker-Arnott as *Agrostis* sp.; ex Glasgow ('GL' stamp) [ex Herb. Lindley]. **E 00680867:** Van Diemen's Land, *s. dat.*] *Gunn 1006*; conf. Brown 5.vi.2018; det. Munro as *Deyeuxia aemula*, *Lachnagrostis aemula* & *Agrostis* [sheet]; ex Herb. Munro 1880; ex J.D. Hooker 1852.

Lachnagrostis aemula: **CGE 34010(b)** [Fig. 2]**:** Van Diemen's Land, 1838, *Everett s.n.*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *Agrostis aemula*; det. Munro as *Deyeuxia aemula* [pencil]; det. Nees as *L. aemula* & *Agrostis aemula*; cit. Nees (1843); ex Herb. Lindley 1866 [single leafless emerging infloresence similar to *L. aemula:* CGE 34010(a)].

Lachnagrostis aemula: **HO 515596(b):** Tasmania, *s. dat.*, *Gunn 1007* [Gunn's Herb. label]; det. Brown 19.vi.2018; det. anon. as *Agrostis billardieri* & *Deyeuxia billardieri* [two spec. with *L. billardierei* & *L. filiformis*].

Lachnagrostis billardierei* subsp. *billardierei: **HO 515596(a):** Tasmania, *s. dat.*, *Gunn 1007* [Gunn's Herb. label]; det. Brown 19.vi.2018; det. anon. as *Agrostis billardieri* & *Deyeuxia billardieri* [three spec. with *L. aemula* & *L. filiformis*]. **NSW 546333:** C.H. [Circular Head], Sand Hills, '1837' [1838], [*Gunn*] *1007* [orig. spec. label & Gunn's Herb. label]; det. Vickery 4.v.1939 as *A. billardierei*; det. anon. as *A. billardieri* & *D. billardieri*. **NSW 546334:** Sand Neck [probably Circular Head], 8.i.1838, *Gunn 1007* [orig. spec. label & Gunn's Herb. label]; det. anon. as *A. billardieri* & *D. billardieri*; spec. label marked '*Lachnagrostis Billardieri*' & 'CS' [Charlotte Smith]. **K 000607841:** Van Diemen's Land, *s. dat.*, *Gunn 1007*; det. Brown 19.x.2017; det. Bentham as *Lasiagrostis billardieri*; ex Herb. Bentham; ex Herb. Lindley 1838; cit. Hooker (1858), Bentham (1878) & Vickery (1941); with *Lachnagrostis billardierei:* K 000607842: King's Island, *s. dat.*, *Neate s.n.*; ex Herb. Mueller 1879. **K 000342399:** Sand near Beach, 8.i.1838, Gunn 1007; det. Brown 13.vi.2018; det. Vickery 9.viii.1938 as *A. billardierei*; det. Bentham as *D. billardieri*; det. Hooker as *L. billardieri*; cit. Hooker (1858) & Vickery (1941) as "on Ocean Beach". **CGE 34012:** Insula Van Diemen, *s. dat.*, *Gunn 1007*; det. Brown 11.ix.2019; det. Vickery 12.vii.1938 as *A. billardierei* & annot. "mixed with leaves of *Festuca littoralis* (?)"; det. Nees as *Lasiagrostis billardieri* & *A. billardieri*; cit. Nees (1843); ex Herb. Lindley 1866. **CGE 34013(a)**: V. Diemen's Land, *s. dat.*, *Gunn s.n.*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *A. billardieri*; det. anon. as *D. billardieri* [sheet]; det. anon. as *A. aemula* & *D. aemula* [pencil]; ex Herb. Lemann 1852; ex Herb. Lindley [three spec. with *L. aemula*]. **W nd08:** V.D.L., *s. dat.*, [*Gunn*]; det. Brown 19.iv.2018; det. Trinius as *Agrostis billardieri*; ex Herb. Lindley 1839 [unstamped]. **P 02650859:** Van-Diemen, *s. dat.*, [*Gunn*]; det. Brown 2.x.2019; det. anon. as *D. billardieri*; ex Herb. Lindley 1839. **G 00412136:** Terre de Van Diemen, *s. dat.*, [*Gunn*]; det. Brown 2.x.2019; det. anon. as *D. billardierei*; ex Herb. Lindley 1839; ex Herb. E. Boissier.

Lachnagrostis filiformis: **K 000342385:** Van Diemen's Land, *s. dat.*, *Gunn 1006*; det. Brown 12.vi.2018; det. Munro? as *L. aemula* [pencil]; det. Hooker? as *L. avenacea* [sheet]; ex Herb. Munro 1880; ex J.D. Hooker 1852; annot. anon. "Differs from *1006* Hb. Hooker" [pencil] [probable ref. to K 000607849] in pencil on sheet [same sheet as K 000342386]. **W nd07:** V.D.L., *s. dat.*, [*Gunn*]; det. Brown 18.vii.2018; det. Trinius as *Agrostis aemula*; ex Herb. Lindley 1839 [unstamped] [dissimilar to *L. filiformis* on LE TRIN–1584.6, so unlikely source for such].

Lachnagrostis filiformis: **HO 515596(c):** Tasmania, *s. dat.*, *Gunn 1007* [Gunn's Herb. label]; det. Brown 19.vi.2018; det. anon. as *Agrostis billardieri* & *Deyeuxia billardieri* [one spec. with *L. billardierei* & *L. aemula*].

Lachnagrostis filiformis: **K 000342386:** Van Diemen's Land, *s. dat.*, *Gunn 1008*; det. Brown 12.vi.2018; det. Bentham as *L. willdenowii* & *Deyeuxia forsteri*; ex Herb. Bentham; ex Herb. Lindley 1838 [same sheet as K 000342385]. **CGE 34005(b):** Insula Van Diemen, *s. dat.*, *Gunn 1008*; det. Brown 11.ix.2019; det. Vickery 12.viii.1938 as *Agrostis avenacea*; det. Nees as *L. willdenowii* Trin.; ex Herb. Lindley 1866; cit. Nees (1843) & Vickery (1941); with *L. filiformis:* CGE 34005(c): from Interior of New Holland, Major Mitchell's Expedition 183_.

Lachnagrostis rudis* subsp. *rudis: **HO 35754:** Doctor's Boat Shed, Circular Head, 18.i.1838, *Gunn 1005* [orig. spec. label [pencil] & Gunn's Herb. label]; det. De Salas 23.vii.2015; det. anon. as *L. scabra* (Beauv.) Nees ex Steud. subsp. *scabra* [nom. illeg., nom. superfl.]; det. anon. as *L. aequata*; det. anon. as *Agrostis aequata*; det. as *A. aequata* & *Deyeuxia aequata*; det. anon. as iso of *A. aequata*. **HO 39274:** Doctor's Boat Shed, Circular Head, 18.i.1838, *Gunn 1005*; det. De Salas 23.vii.2015;

det. anon. as *L. scabra*; det. anon. as *L. aequata*; det. anon. as iso of *A. aequata*. **NSW 546292:** Tasmania, *s. dat.*, *Gunn* [*1005*]; det. Vickery 4.v.1939; det. Bentham as *D. aequata ß* (examined by Bentham); ex Herb. Mueller. **NSW 546295 *n.v.*:** Dr. Boat Shed, 1838, [*Gunn*] *1005/1837*; det. anon. **MEL 2273954A:** Tasmania, 18.i.1838, *Gunn s.n.*; det. Brown 1.iii.2018; det. Jeanes as *L. aequata*, 16.iii.2005; det. anon. as *A. rudis*, 2001; det. Vickery 28.i.1944 as *A. aequata*; det. Mueller as *A. aequata* "with *Agropyr. scabrum*"; det. Jeanes 16.iii.2005 as syn of *A. aequata*; annot. anon. "apparently Co-Type (but Gunn's number not attached)" & "(No. *1005?*)"; ex Herb. Mueller. **K 000838269:** Tasmania, 18.i.1838, *Gunn 1005*; det. Brown 17.v.2018; det Brown 7.x.2003 as *L. scabra*; det. Bentham as *Deyeuxia aequata*; det. Hooker? as *A. aequata*; incl. figs. for CLIXB; annot. Vickery 9.vii.1938 "matches type of *Agrostis aequata* Nees at Cambridge"; annot. Bentham "contin of rhach. short, scantily haired"; cit. Hooker (1858) & Bentham (1878). **K 000838270:** Tasmania, *s. dat.*, *Gunn 1005*; det. Brown 17.v.2018; det Brown 7.x.2003 as *L. scabra*; det. Bentham as *D. aequata*; det. Bentham? as *A. aequata* [no label, probably 2nd sheet for K 000838269]. **CGE 05050:** Insula Van Diemen, *s. dat.*, *Gunn 1005*; det. Brown 11.ix.2019; det. Nees as *A. aequata*; det. Herb. Univ. Catab. as Type of *A. aequata*; ex Herb. Lindley 1866; cit. Nees (1843) & Vickery (1941) as Type of *A. aequata* at C. **CGE nd03:** V. Diemen's Land, *s. dat.*, [*Gunn 1005*]; det. Brown 11.ix.2019; det. Lemann as '*A. aequata* auct. to *A. capillaris*'; spec. label marked '*Agrostis* No. 28'; ex Herb. Lemann 1852; ex Herb. Lindley 1849. **E 00886057:** Insula Van Diemen, *s. dat.*, *Gunn 1005*; det. Brown 6.vi.2018; det. Walker-Arnott as *Agrostis* sp.; ex Glasgow ('GL' stamp) [ex Herb. Lindley]. **E 00680912:** Ins. Van Diemen, *s. dat.*, [*Gunn 1005*]; det. Brown 6.vi.2018; det. anon. as *Agrostis*; ex Herb. Ball 1891. **W 1916-0026741:** Tasmania, 18.i.1838, *Gunn s.n.*; det. Brown 19.iv.2018; det. Mueller as *A. aequata*; det. Pignotti 24.ii.2010 as type of *A. aequata*; ex Herb. Hackel; ex Herb. Mueller. **G 00412131** [Fig. 7]**:** Tasmania, *s. dat.*, *Gunn s.n.*; det. Brown 2018 from image; det. Boissier as '*A. parviflora* R Br var. *A. scabra* Anton's Land'; ex Herb. Boissier; ex [Herb.] Munro; ex Herb. Bentham 1849; ex J.D. Hooker 1844. **GH nd03:** Van Diemens Land, *s. dat.*, *Gunn 1005*; det. Brown 2018 from image; det. Munro as '*A aequata* N al: E. [N autem E], in Hook. Jour. of Bot.'; ex [Herb.] Munro. **US 733837:** Tasmania, 18.i.1838, *Gunn. s.n.*; det. Poaceae Reorganization Project; det. anon. as *Agrostis aequata*; ex U.S. National Museum; ex U.S. Dept. Ag.; ex Herb. MEL as *Deyeuxia aequata* (*Agrostis aequata*).

***Pentapogon quadrifidus* var. *parviflorus*: NSW 550580:** Neck Marsh [probably Circular Head], 11.i.1837, *Gunn 989* [orig. spec. label [pencil] & Gunn's Herb. label]; det. Brown 19.vi.2018; det. Kodela as *P. quadrifidus*; det. anon. as *P. billardieri*.

***Pentapogon quadrifidus* var. *quadrifidus*: CGE 33443(a)**: *s. loc.*, *s. dat.*, *Gunn 989*; det. Brown 11.ix.2019; det. Nees as *P. billardieri* & ex parte; ex Herb. Lindley 1866; cit. Nees (1843). **CGE nd04(a):** V. Diemen's Land, *s. dat.*, [*Gunn*]; spec. label marked as '*Amphipogon avenaceus* No. 12, VDL'; ex Herb. Lemann 1852 [four spec. on RHS side].

C. Gunn and Hooker collections: 1838–1839 to 1844–1845 seasons.

Dec 1846 consignment; first specimens of Gunn's 1400s collection/taxon numbers; includes newer specimens of his earlier collection/taxon numbers and occasional use of an older and newer number for the same collection; includes collections made by Mary Ballantine and Charles Stuart for Gunn.

***Agrostis parviflora:* NSW 548811:** Mt Wellington, 1.iii.1839, *Gunn 1449* [Gunn's Herb. label & plain label]; conf. Brown 14.vi.2018; det. anon. as *A. parviflora*; det. anon. as *A. scabra* Willd. **NSW 548824:** Mt Wellington, 1.iii.1839, *Gunn 1449* [Gunn's Herb. label & plain label]; conf. Brown 14.vi.2018; det. anon. as *A. parviflora*; det. anon. *A. scabra* Willd. **NSW 548820(b):** *s. loc.*, *s. dat. [Gunn 1449]* [Archer's Herb. label]; det. Vickery 4.v.1939 [assumed to have been sampled by Archer from Gunn's spec. at K]. **K 000838280(b):** Mt Wellington, 1.iii.1839, *Gunn 1449* [orig. label]; det. Brown 1.iv.2010; det. Brown 19.x.2017 as *A.* aff. *muelleriana* Vickery; incl. in det. Bentham as *A. scabra* Willd., Bentham?. as *A. parviflora* & Hooker as '*A. aemula*?' [crossed out] [RHS spec.]. **GH nd06:** Van Diemens Land, *s. dat.*, *Gunn 1449*; det. Brown 2018 from image; det. Munro; ex [Herb.] Munro [pencil].

***Agrostis parviflora:* K 000607850(a):** Mt Wellington, 31.i.1840, *Gunn 1471* [orig. spec. label]; det. Brown 19.x.2017; det. anon. as '*T. parviflora ß*' [same sheet as K 000607851 & K 000607852].

***Agrostis parviflora:* NSW 548825:** base of Mt Wellington, 7.i.1841, *Gunn 1448* [Gunn's Herb. label

& plain label]; conf. Brown 14.vi.2018; det. anon. as *A. parviflora*; det. anon. as *A. scabra* Willd. **NSW 548818:** base of Mt Wellington, 7.i.1841, *Gunn 1448* [orig. label & Gunn's Herb. label]; det. Vickery 26.v.1939; det. anon. as *A. parviflora*; det. anon. as *A. scabra* Willd.; annot. anon. "Spec. sent to U.S. Nat. Mus. Washington, June 1941". **NSW 548820(a):** *s. loc., s. dat., [Gunn 1448]* [Archer's Herb. label]; det. Vickery 4.v.1939 [assumed to have been sampled by Archer from Gunn's spec. at K]. **K 000838280(a):** *s. loc., s. dat., [Gunn 1448]*; det. Vickery 14.vii.1938 & annot. "Matches type of *Agrostis parviflora* R.Br. (this specimen only)"; det. Bentham as *A. scabra* Willd; det Bentham? as *A. parviflora*; det. Hooker as as '*A. aemula*?' [crossed out]; cit. Hooker (1858) & Vickery (1941) as *Gunn 1499* [LHS spec.; assumed to be dupl. of this collection added to *Gunn 1449* sheet]. **K 000838279** [Fig. 1]**:** base of Mt Wellington, 7.i.1841, *Gunn 1448* [orig. label]; conf. Brown 19.x.2017; det. Bentham as *A. scabra* Willd.; det. Bentham? as *A. parviflora*; det. Hooker as *A. aemula?* [crossed out]; cit. Hooker (1858) & Vickery (1941) in part [MID spec. only; same sheet as *A. parviflora:* K 00083877 & *A. venusta:* K 000838278]. **US 1816958:** base of Mt Wellington, 7.i.1841, *Gunn 1448*; det. Brown 2021 from image; ex Herb. NSW.

Agrostis parviflora: **NSW 993502:** side of the Western Mountains [Tiers], 16.i.1845, *Gunn 1448* [orig. spec. label, Gunn's Herb. label]; det. Vickery 26.v.1939; det. anon. as *A. parviflora*/*A. scabra* Willd.; separated from *A. parviflora:* NSW 548818, March 2017. **K 000607852:** side of the Western Mountains, 16.i.1845, *Gunn 1448* [orig. label]; conf. Brown 19.x.2017; det. Bentham as *A. scabra* Willd.; det. Hooker? as *A. parviflora*; cit. Hooker (1858) & Vickery (1941) [same sheet as K 000607850 & K 000607851].

Agrostis parviflora: **NSW 548822:** Arthur's Lake, 17.i.1845, *Gunn 1471* [orig. spec. labels & Gunn's Herb. label]; conf. Brown 14.vi.2018; det. anon. as *A. scabra* Willd. & *A. parviflora* [two small tussocks with separate spec. labels]. **K 000607851:** Arthur's Lake, 17.i.1845, *Gunn 1471* [orig. spec. label]; det. Brown 19.x.2017; det. Hooker as *Agrostis* [same sheet as K 000607850 & K 000607852].

Agrostis parviflora: **NSW 548826:** Nr. Woodhall, S. Esk, *s. dat., Stuart 540* [orig. spec. label]: det. Vickery 12.vii.1938; det. Stuart as '*A. subtilis* FVM' [Ferdinand von Mueller]; spec. label marked '*540*' only [*Gunn 540* was *Beyeria backhousii*; may be an early coll. for Gunn or a later coll. for Mueller but without a typical Mueller label].

Agrostis parviflora: **MEL 2124144A:** Mersey River, 15.i., *Stuart 540*; det. Vickery 28.i.1944 [probably collected for Mueller].

Agrostis venusta: **K 000607843:** Epping Forest, 30.x.[1840?], *Gunn 1008* [orig. spec. label]; det. Brown 19.x.2017; cit. Vickery (1941) as 30.x.1818 [the year obviously wrong; same sheet as K 000607840]. **GH nd04:** *s. loc. s. dat., Gunn 1008?*; det. Brown 2018 from image; det. Munro as *A. venusta* Trin. & *Lachnagrostis willdenowii* Nees; ex [Herb.] Munro [uncertain from which coll. this dupl. was drawn]. **NY 04241812:** Tasmania, *s. dat., Gunn s.n.*; det. Brown 2020 from image; ex Herb. Columbia College [uncertain from which coll. this dupl. was drawn].

Agrostis venusta: **NSW?/K?** (not found)**:** New Norfolk, 4.xi.1840, *Gunn 1008*; cit. Vickery (1941) [possible misrecord of *Austrostipa flavescens*, New Norfolk 4.xi.1840, *R.C. Gunn 996* (HO 128613) or just the date misrecorded].

Agrostis venusta: **NSW 548416:** mountains, New Norfolk, 15.xi.1840, *Gunn 1008*; [Gunn's Herb. label]; conf. Vickery 26.v.1939; det. anon.; annot. Brown 12.vi.2018 "incl. frags. of *Vulpia bromoides* and *Rytidosperma pilosum*" [probably collected by Mary Ballantine]. **UVMVT 127018:** Tasmania, about 1840, *Gunn s.n.* [~~Archer's~~ Gunn's Herb. label]; ex Herb. NSW; det. anon.

Agrostis venusta: **K 000607840:** New Norfolk, 18/25. xi.1840, *Gunn 1008* [orig. label]; conf. Brown 19.x.2017; det. Hooker? as *A. venusta* & *L. willdenowii* Nees; det. Hooker? '*Agrostis* [pencil] *gunnii* H.f.' [crossed out]; cit. Hooker (1858) & Vickery (1941) [probably collected by Mary Ballantine, possibly on two separate dates from the same site; same sheet as K 000607843].

Agrostis venusta: **NSW?/K?** (not found)**:** New Norfolk, 10.xii.1840, *Gunn 1008*; cit. Vickery (1941) [no coll. of this date for any Tasmanian collector appears on AVH].

Agrostis venusta: **NSW 548417:** Glen Leith, 28.xii.1840, *Gunn s.n.*; conf. Brown 14.vi.2018; det. anon.; annot. anon. "separated from a sheet of *Poa* sp." [probably *P. gunnii*: NSW 46031: Glen Leith, 28.xii.1840, *Gunn s.n.*].

Agrostis venusta: **K 000838278** [Fig. 1]**:** base of Mt Wellington, 7.i.1841, *Gunn 1448* [orig. label]; conf. Brown 19.x.2017; det. Vickery [pencil on sheet]; cit. Vickery (1941) in part [RHS spec.; same sheet as *A. parviflora:*

K 000838277 & *A. parviflora:* K 000838279; it is possible that this specimen derives from K 000838272–73, K 000607840 or K 000607843 and was placed unlabelled on this sheet as a comparison to *A. parviflora*].

Agrostis venusta: **NSW?/K?** (not found)**:** Kenmore, 19.xi.1842, *Gunn 1008*; cit. Vickery (1941) [possible misrecord for *Poa hookeri Gunn 1469:* HO 26251; NSW 9051 or *Koeleria macrantha Gunn 586:* HO 61690; NSW 558007; K 000808791: both coll. Kenmore, 19.xi.1842, *M. Ballantine s.n.*].

Agrostis venusta: **NSW?/K?** (not found)**:** Yorktown, 25.i.1844, *Gunn 1008*: cit. Vickery (1941) [a number of spec. of this date and location are lodged at NSW but none of this taxon].

Deyeuxia frigida: **K 000342410:** New Norfolk, xi.1840, *Hooker 1186* [orig. label]; det. Brown 13.vi.2018; det. Vickery as *D. accedens*; det. Bentham as *D. frigida*; det. Hooker as *A. scabra* R.Br.; det. Hooker as *A. montana & D. montana* [pencil]; incl. fig. for CLX~~B~~A; annot. Bentham? "this is not the specimen figured" [pencil]; cit. Bentham (1878) as *D. frigida Gunn s.n.* & Vickery (1940) as *D. accedens Gunn 1106* [*Gunn 1106* is *Eucalyptus delegantensis* subsp. *tasmaniensis* Boland; probably collected with Gunn].

Deyeuxia frigida: **K 000342407:** going to Arthur's Lakes, 17.i.1845, *Gunn 1462* [orig. spec. label]; det. Brown 13.vi.2018; det. Vickery as *D. accedens*; det. Bentham as *D. scabra* [sheet]; det. Hooker as *Agrostis scabra* R.Br. [sheet]; det. Hooker & annot. "*D. scaberula* awned"; cit. Vickery (1940) as *D. accedens* in part; cit. Hooker (1858) as *Agrostis scabra* R.Br., Arthur's Lakes [same sheet as *D. scaberula:* K 000342408 & *D. frigida:* K 000342409].

Deyeuxia frigida: **HO 65064:** St Patrick's River, 1.iv.1845, *Gunn 1461* [orig. spec. label & Gunn's Herb. label]; det. Morris 14.i.1991; det. anon. viii.1976 as *D. scaberula*; det. as *Agrostis scabra* [not specified] & *D. scabra*. **K 000342409:** St Patrick's River, 1.iv.1845, *Gunn 1461* [orig. spec. label]; det. Brown 13.vi.2018; det. Vickery as *D. accedens* in part; det. Bentham as *D. scabra* [sheet]; det. Hooker as *Agrostis scabra* R.Br. [sheet]; det. Hooker & annot. "*D. scaberula* awned" [two small spec.; same sheet as *D. frigida:* K 000342407 & *D. scaberula:* K 000342408].

Deyeuxia innominata: **K 000607850(b):** Mt Wellington, 31.i.1840, *Gunn 1471* [orig. label]; det. Brown 19.x.2017 [same sheet as K 000607851 & K 000607852].

Deyeuxia monticola: **HO 128376:** Mt Wellington, 1.iii.1839, *Gunn 1479* [orig. spec. label & Gunn's Herb. label]; det. anon. viii.1976; det. anon. as *Agrostis montana* & *D. montana*; spec. label on LHS spec. with details [the two spec. appear to have come from different coll.]. **NSW 548985:** Mt Wellington, 1.iii.1839, *Gunn 1479* [orig. spec. label & Gunn's Herb. label]; det. Vickery 29.xii.1938; det. anon. as *Agrostis montana* & *D. montana.* **K 000342414:** Mt Wellington, 1.iii.1839, *Gunn 1479* [orig. spec. label]; conf. Brown 13.vi.2018; det. Vickery; det. Bentham as *D. montana* [sheet]; det. Bentham as *D. ambigua* [label]; det. Hooker as *A. montana* [crossed out] & annot. "glumes 1/2 larger than palea, setula villora half as large as palea, palea very scaberous 4 points, inner larger, awn 3/4 way down" [coll. placed over K 000342413, though earlier]; cit. Vickery (1940) as 1.ii.1839.

Deyeuxia monticola: **K 000342413:** Mt Wellington, 31.i.1840, *Gunn 1479?* [orig. label]; conf. Brown 13.vi.2018; det. Vickery; det. Bentham as *D. montana* [sheet]; det. Bentham as *D. ambigua* [label]; det. Hooker as *Agrostis montana* [pencil on label & ink on sheet]; det. Hooker as *Agrostis* [crossed out]; incl. fig. for CLXA; cit. Hooker (1858) as *Agrostis montana* & Vickery (1940) [same sheet as K 000342414]. **K 000342412(a):** Mt Wellington, 31.i.1840, *Gunn 1479* [orig. spec. label]; det. Vickery; det. Bentham as *D. montana*; det. Hooker as *D. montana* & *A. montana*; det. Hooker? as *Pentapogon* [RHS spec.] with *D. monticola:* K 000342412(b): Tasmania, s.dat, *Oldfield s.n.* [spec. in MID and LHS].

Deyeuxia monticola: **NSW 549223:** Hobart Town, 14.xii.1840, *Gunn 991?* [orig. spec, label & Gunn's Herb. label photocopy]; det. Brown 14.vi.2018; det. anon. as *D. quadriseta*. **K 000342415:** Hobart, 14.xii.1840, *Gunn 991?* [orig. spec. label]; det. Vickery; det. Hooker as '*Ag. 4-seta*'; cit. Hooker (1858) as *Agrostis quadriseta* var. *ß* montana & Vickery (1940) in part.

Deyeuxia monticola: **NSW 548980:** Mt Wellington, *s. dat., Gunn 1479* [orig. spec. details & ~~Archer's~~ Gunn's Herb. label]; det. Vickery 4.i.1939 & annot. "separated from specimens of *D. rodwayi*" [NSW 549690].

Deyeuxia quadriseta: **HO 40259:** sandy plains, George Town, 10.i.1840 [1843], *Gunn s.n.* [Gunn's Herb. label]; det. anon. [Buchanan (1988) notes George Town as the collecting location for 10.i.1843, so 1840 is most likely to be a misdate]. **NSW 549222:** sandy

plains, George Town, 10.i.1843, *Gunn 991?* [orig. spec. label & Gunn's Herb. label. photocopy]; conf. Brown 14.vi.2018; det. anon. **K 000342406:** sandy plains, George Town, 10.i.1843, *Gunn 991* [orig. spec. label]; det. Brown 13.vi.2018; Hooker annot. "awn below middle, palea smooth, 4 short teeth or bifid" [same sheet as K 000342405].

Deyeuxia quadriseta: **K 000342417:** base of Mt Wellington, 7.i.1841, *Gunn 1447* [orig. label]; conf. Brown 13.vi.2018; det. Bentham; det. Bentham? as *Agrostis quadriseta*; det. Hooker as *Agrostis* & annot. "awn basal"; cit. Vickery (1940) as Form *G*. **US 843508:** Tasmania, *s. dat.*, *Gunn s.n.*; det. Brown 2021 from image; det. Poaceae Reorganization Project as *Dichelachne quadriseta* Ined.; det. anon. as *Agrostis quadriseta*; ex Herb. U.S. Dept. of Ag. [unknown location but panicles are similar to *Gunn 1447*].

Deyeuxia quadriseta: **NSW 548859:** Marlborough, 8.i.1841, *Gunn 1489* [orig. spec. label & Gunn's Herb. label]; conf. Brown 14.vi.2018; det. anon.; cit. Vickery (1940) as Form *G*. **K 000342404:** Marlborough, 8.i.1841, *Gunn 1489* [orig. spec. label]; conf. Brown 13.vi.2018; det. Bentham; annot. Hooker "very large glumes" [separated from *D. lawrencei:* K 000838424 pre 1938].

Deyeuxia quadriseta: **HO 130815(a):** Penquite, 13.xi.1841, *Gunn 991?*; det. anon.; noted as 'Alternative date 13 Nov 1841.'; plain label with details. **NSW 549205:** Penquite, 13.xi.1841, *Gunn 991?* [orig. spec. label & ~~Archer's~~ Gunn's Herb. label]; conf. Brown 14.vi.2018; det. anon. **K 000342405:** Launceston, 13.xi.1841, *Gunn 991?* [orig. spec. label]; conf. Brown 13.vi.2018; det. Bentham; det. Hooker? as *Agrostis quadriseta*; annot. Hooker "awn nearly basal, palea nearly smooth, palea teeth nearly equal"; cit. Vickery (1940) as Form *G*.

Deyeuxia quadriseta: **HO 130815(b):** Penquite, 1.xii.1844, *Gunn 991?*; det anon.; plain label with details. **MEL 1602574A:** Penquite, 1.xii.1844, *Gunn 991*; det. anon.; ex Herb. HO. **NSW 548851:** *s. loc., s. dat., Gunn 991?*; conf. Vickery 4.i.1939; det. anon. [unsure placement but similar appearance to NSW 548860]. **NSW 548858:** *s. loc., s. dat.*, [*Gunn s.n.*] [Gunn's Herb. label]; det. unknown [unsure placement but similar appearance to NSW 548860]. **NSW 548860:** Penquite, 1.xii.1844 & 9.xii.1844, *Gunn 991?* [Gunn's Herb. label]; conf. Brown 14.vi.2018; det. anon.; plain label with details [only one plant plus a frag. of a base – perhaps 9.xii.1844 represents the date of a revisit to the same site when coll. of *Lachnagrostis aemula* and *L. semibarbata* were made (see below)].

Deyeuxia quadriseta: **K 000342416:** Van Diemen's Land, *s. dat.*, *Gunn 1479*; det. Brown 13.vi.2018; det. anon. as *Deyeuxia* [sheet]; det. anon. as *Agrostis quadriseta* [pencil on sheet]; ex Herb. Munro 1880 [possibly of two separate collections: the LHS plant with contracted inflorescences; the RHS plant with open inflorescences]. **BM 001209653:** Tasmania, *s. dat.*, *Gunn s.n.*; det. Brown 2017 from image; det. Hance? as '*Deyeuxia*, Clar. *quadriseta*, Benth.; det. Hance? as '*Agrostis*, L. *quadriseta* ~~lobata~~ R.Br. (J.D.H.)' & annot. "O. N. Agrostidaceae"; ex Herb. H.F. Hance 1887 as No. 8072 [the source of this coll. is unknown but is listed here as Hance's visit to Kew in 1852 coincided with Munro's receival of Gunn collections from Hooker].

Deyeuxia rodwayi: **NSW 549715:** Mt Wellington, 1.iii.1839, *Gunn 1462* [orig. spec. label & Gunn's Herb. label]; det. Vickery 11.i.1939; det. anon. as *A. scabra* [not specified] & *D. scabra*; cit. Vickery (1940).

Deyeuxia rodwayi: **HO 65061:** Mt Wellington, 29.i.1841, *Gunn 1462* [orig. spec. label & Gunn's Herb. label]; det. Morris 12.vi.1981; det. anon. as *A. scabra* & *D. scabra* [not specified]. **NSW 549690:** Mt Wellington, 29.i.1841, *Gunn 1479* [orig. spec. labels [two identical] & Gunn's Herb label]; det. Vickery 4.i.1939; det. anon. as *Agrostis montana* & *D. montana*; annot. Vickery "a specimen of *D. monticola* separated from this sheet" [NSW 548980]; cit. Vickery (1940) as "No. *1479* in part, 29.i.1849".

Deyeuxia scaberula: **NSW 549603:** base of Mt Wellington, 7.i.1841, *Gunn 1462*; det. Vickery 30.xii.1938 & as Type of *D. scaberula* and annot. "portion of the type, from the herbarium, Royal Botanic Gardens, Kew"; det. Jobson 21.vi.2013 as iso of *D. scaberula.* **NSW 549604:** base of Mt Wellington, 7.i.1841, *Gunn 1462* [Gunn's Herb. label]; det. Vickery 30.xii.1938 & as Type of *D. scaberula*; det. anon. as *Agrostis scabra* [not specified] & *D. scabra*; det. Jobson 21.vi.2013 as iso of *D. scaberula*; plain label with details. **MEL 2278938A:** base of Mt Wellington, 7.i.1841, *Gunn 1462*; det. anon.; det. anon. as iso; ex Herb. NSW. **K 000838402:** base of Mt Wellington, 7.i.1841, *Gunn 1462* [orig. spec. label]; det. Vickery; det. Bentham as *D. scabra*; det. Hooker? as '*A. scabra*, Br. ~~*D. scaberula*, Hf.~~' incl. fig. for CLXB; packet with "these florets do not

belong to this specimen JWV 31/3/38" [pencil]; Vickery annot. "portion separated for the National Herbarium, Sydney"; cit. Hooker (1858) as *A. scabra* R.Br. & Vickery (1940) in part as Type at K. **GH nd08:** Van Diemens Land, *s. dat.*, *Gunn 1462*; det. Brown 2018 from image; det. Munro as *Lachnagrostis rudis* & *Agrostis scabra* R.Br.; ex [Herb.] Munro; ex Hook. fil. [J.D. Hooker].

Deyeuxia scaberula: **K 000342408:** St Patrick's River, 1.iv.1845, *Gunn 1461* [orig. spec. label]; det. Brown 13.vi.2018; det. Vickery as *D. scaberula* in part [pencil]; det. Bentham as *D. scabra* [sheet]; det. Hooker? as *A. scabra* R.Br. [sheet]; det. Hooker & annot. "*D. scaberula* awned"; [one small spec.; same sheet as *D. frigida:* K 000342407 & *D. frigida:* K 000342409]. **GH nd07:** Mt Wellington, *s. dat.*, *Gunn ~~1011~~ 1461*; det. Brown 2018 from image; det. Munro as *Lachnagrostis scabra* & *Agrostis scabra* R.Br. and annot. "but not of Willd."; ex Munro; ex Hook. fil. [J.D. Hooker] [assumed to be sampled from K 000342408 with confusion over location, which should have been applied to GH nd08].

Deyeuxia scaberula: **K 000342411:** Nth Huon River, 15.i.1846, *Gunn s.n.* [orig. spec. label]; conf. Brown 13.vi.2018; det. Hooker? as *A. scabra* R.Br. & *D. scaberula* Hf.; cit. Bentham (1878).

Dichelachne crinita: **NSW 448445:** Hobart, 14.xii.1840, *Gunn 989* [orig. spec. label & Gunn's Herb. label photocopy]; det. Brown 14.vi.2018; det. anon. as *D. micrantha*; det. anon. as *D. sciurea* [originally combined with *D. rara:* NSW 448443 & *D. sieberiana:* NSW 448444].

Dichelachne crinita: **K 000913403(a):** V. D Land, [ix.1840], *Hooker s.n.* with *D. crinita:* K 000913403(b): [Port Jackson], [1823], *Sieber 86*; det. Veldkamp ix.1971 as *D. crinita* & as iso of *D. comata* Trin. & Rupr. and *D. crinita:* K 000913402: N. Holl., [1792], *Labillardière s.n.*; det. Bentham; det. Bentham as *A. crinita* [pencil on sheet]; det. anon. as '*Anthoxanthum crinitum* Lab.'; ex Herb. Webb. [assumed to be Labillardière coll. as *A. crinitum* is a L.f. name and Philip Barker Webb (1793–1854) purchased his herb.].

Dichelachne crinita: **NSW 550223:** Formosa, 7.xii.1842, *Gunn 1447*; det. Brown 14.vi.2018; det. anon. as *D. micrantha* [pencil]; det. anon. as *Dichelachne*; annot. anon. "separated from a sheet of *Agrostis avenacea*" [NSW 13521].

Dichelachne rara: **NSW 448443:** Recherche Bay, xii.1838, *Gunn 989* [orig. spec. label & Gunn's Herb. label]; det. Brown 14.vi.2018; det. anon. as *D. micrantha*; det. as *D. sciurea* [originally combined with *D. sieberiana:* NSW 448444 & *D. crinita:* NSW 448445].

Dichelachne rara: **NSW 448442:** Penquite, 1.xii.1844, *Gunn 989* [Gunn's Herb. label]; det. Simon 30.iv.2008 & annot. "this is not a type of *D. rara* subsp. *asperula* (= *D. sieberiana*)"; det. anon. as *D. sciurea*; plain label with details [orig. combined with *Pentapogon quadrifidus:* NSW 471900 & *Vulpia bromoides:* NSW 471901].

Dichelachne sieberiana: **NSW 448444:** Glen Leith, 28.xii.1839, *Gunn 989* [orig. spec. label & Gunn's Herb. label photocopy]; det. Brown 14.vi.2018; det. anon. as *D. micrantha*; det. anon. as *D. sciurea* [originally combined with *D. rara:* NSW 448443 & *D. crinita:* NSW 448445].

Dichelachne sieberiana: **NSW 549137:** Hobart Town, 14.xii.1840, *Gunn 998*; det. Brown 14.vi.2018; det. anon. *D. inaequiglumis*; separated from *Rytidosperma* sp. [*tenuius*]: NSW1659.

Dichelachne sieberiana: **NSW 550233:** Penquite, 16.xii.1844, *Gunn 1478*; det. Brown 13.vi.2018 & annot. "based on examination of duplicate K 000356726 with this specimen"; det. anon. as *D. micrantha*; det. anon. as *D. sciurea* [frag. with a few spikelets]. **K 000356726:** Penquite, 16.xii.1844, *Gunn 1478* [orig. spec. label]; det. Brown 12.vi.2018; det. Bentham as *D. sciurea*; det. anon. as *Pentapogon billardieri* [crossed out]; det. anon. as *D. sciurea* [pencil]; cit. Hooker (1858) as *D. sciurea*. **NY 04241811:** Tasmania, *s. dat.*, [*Gunn*] s.n.; det. Brown 2020 from image; ex Herb. Columbia University; ex Herb. Bentham?; ex Herb. Lindley; critical notes by B.P.G. Hochreutiner: 1907, Name "*Dichelachne sciurea*", Plant identical with *"types"*, Named by *"Hooker f. himself as above"*, in *"Hb. Kew"* [the relatively narrow and compact panicles of these spec. suggest it to be dupl. of this collection].

Dichelachne sieberiana: **HO 130492:** Penquite, xii.1845, *Gunn 989?*; **NSW 551042:** Penquite, xii.1845, *Gunn 989*; det. Brown 13.vi.2018; det. Simon 6.v.2008 as *D. rara*; det. anon. as *Dichelachne* & annot. "this specimen was the basis of Hooker's fig CLVIII A in Hook. Fl. Tas."; annot. on packet "branching panicle like *rara*" [frag. of a few spikelets]. **NSW 550510:** Penquite, xii.1845, *Gunn 989?* [orig. spec. label & Gunn's Herb. label]; det. Kodela 29.iii.2017 & annot. "possible Type material of *D. rara* subsp. *asperula* Veldkamp = *D. sieberiana* Trin. & Rupr."; det. anon. as *D. sciurea*. **K 000342388:** Penquite, xii.1845,

Gunn 989? [orig. spec. label]; det. Brown 13.vi.2018; det. Bentham? and Hooker? as *D. sciurea*; incl. two separate figs – one being the basis for Hooker (1858) CLVIII A; cit. Hooker (1858). **BM** (not found): Penquite, xii.1845, *Gunn 989*; cited by Veldkamp (1975) as an iso of *D. rara* var. *asperula*. **L 0044116:** Penquite, xii.1845, *Gunn ?989*; det anon.; det. anon. as Type of *D. rara* subsp. *asperula* [frag. of a few spikelets; probably sampled by Veldkamp from K dupl.]. **NY 04241824:** det. Brown 2020 from image; det. anon. as *D. sciurea*; ex Herb. George V. Nash, ex Herb. Geo. Thurber; ex Herb. A. Gray.

Dichelachne sieberiana: **US 733706:** Southport, [1855–1857], [*Stuart*]; det. Brown 2021 from image; annot. anon. as "*Dich. sciurea* Hf. Plate CLVIII A", "*989?* Tasmania *Gunn*" and "This is the form Hooker figured as *D. sciurea* (based on *Agrostis sciurea* RBr.) but is not Brown's species (see types)"; ex U.S. National Museum; ex U.S. Dept. Ag.; ex Herb. MEL as *Dichelachne sciurea* (*Stipa dichelachne*) Fam.-partim., J.D. Hooker, Southport, Tasmania [probable C. Stuart collection from 1855–1857 (see text under 'Joseph Hooker and Charles Stuart') Hooker and Charles Stuart'; refs. to Gunn and Hooker may allude to the similarity of this collection with that of Gunn's used by Hooker (1858) for his illustration; note "Brown's species" is *D. micrantha*].

Echinopogon ovatus: **HO 128573:** Cataract, South Esk, 17.xii.1844, *Gunn 590*; det. anon.; Gunn No. on HO label but not on original label [spec. mounted on card; possible C. Stuart coll.]. **NSW 546566:** South Esk, Cat^{t}, 17.xii.1844, [*Gunn*] *590* [orig. spec. label, Gunn's Herb. label; det. anon.

Lachnagrostis aemula: **HO 128189:** New Norfolk, 11.xii.1840, *Gunn 592* [orig. spec. label, ~~Archer's~~ Gunn's Herb. label]; det. anon.; det. Morris 4.ix.1980 as *Agrostis aemula*; det. anon. as *Deyeuxia forsteri*; coll. Mary Ballantine (MB). **NSW 13513:** New Norfolk, 11.xii.1840, *Gunn ~~592~~ 1446* [orig. spec. label]; det. Brown 2.iii.2007; det. Jacobs 26.ii.2003; det. anon. as *A. aemula*; cit. Vickery (1941) [orig. with *L. semibarbata*: NSW 742910]. **K 000607848(a):** New Norfolk, 11.xii.1840, *Gunn 592* [orig. label]; det. Brown 20.x.2017; det. Hooker? as *D. forsteri*; cit. Hooker (1858) as *A. aemula* [with *L. filiformis*].

Lachnagrostis aemula: **NSW 13516:** Macquarie Plains (Bushy Park area), 19.xi.1842, *Gunn 592* [orig. spec. label & Gunn's Herb. label]; det. Jacobs 26.ii.2002; det. Vickery 18.v.1939 as *Agrostis aemula*; det. anon. as *Deyeuxia forsteri*; coll. Mary Ballantine (MB); cit. Vickery (1941). **K 000342384:** Macquarie Plains, 19.xi.1842, *Gunn 592* [orig. spec. label]; det. Brown 12.vi.2018; det. Vickery 11.viii.1938 as *A. aemula*; det. Bentham as *Deyeuxia billardieri*; det. Hooker? as '*D. Billardieri* var.' [pencil]; det. Bentham. as *Deyeuxia* [ink] and Hooker? as *aemula* [pencil]; cit. Hooker (1858).

Lachnagrostis aemula: **NSW 13519:** marshes Formosa, 7.xii.1842, *Gunn 1447* [orig. spec. label]; det. anon. i.2003; conf. Vickery 19.v.1939; det. anon. as *Agrostis aemula*.

Lachnagrostis aemula: **NSW 13512:** Penquite, 9.xii.1844, *Gunn 592* [orig. spec. label & ~~Archer's~~ Gunn's Herb. label]; det. Jacobs 26.ii.2002; det. Vickery 18.v.1939 as *Agrostis aemula*; det. anon. as *Deyeuxia forsteri*; cit. Vickery (1941).

Lachnagrostis aemula: **NSW 13518:** side of the Western Mountains, 16.i.1845, *Gunn 592* [orig. spec. label]; det. anon. i.2003; det. anon. as *A. aemula* [one of three spec. with spec. label marked '*592*' only; may represent earlier coll.]. **K 000607846** and **K 000607847:** side of the Western Mountains, 16.i.1845, *Gunn 592* [orig. spec. label]; det. Brown 7.vi.2018; det. Vickery 11.viii.1938 as *Agrostis aemula* [upside down]; det. Hooker? as *Deyeuxia forsteri* [upside down]; cit. Hooker (1858) & Vickery (1941) [two spec. which look very similar but with different catalogue nos.].

Lachnagrostis aemula: **NSW 13517:** Tasmania, *s. dat., Milligan 202*; cit. Vickery (1941) as "Gunn No. 1008 and No. 202" [label notes Gunn as collector but with initials JM].

Lachnagrostis filiformis: **K 000607839:** base of Mt Wellington, 1.iii.1839, *Gunn 1447* [orig. label]; det. Brown 25.x.2017; det. Vickery 10.viii.1838 as *Agrostis avenacea*; det. Hooker? as *Deyeuxia forsteri*; det. anon. as *Agrostis*; cit. Hooker (1858) & Vickery (1941).

Lachnagrostis filiformis: **K 000607838:** New Norfolk, xii.1839, *Gunn 1447* [orig. spec. label]; det. Brown 25.x.2017; det. Vickery 10.viii.1838 as *Agrostis avenacea*; det. Hooker? as *Deyeuxia forsteri*; cit. Hooker (1858) & Vickery (1941). **GH nd05:** Van Diemens Land, *s. dat., Gunn 1447*; det. Brown 2018 from image; det. Munro as *D. forsteri* & *A. aemula*; ex [Herb.] Munro [pencil]; ex J. D. H. [Joseph Dalton Hooker] [unknown from which coll. this dupl. was drawn].

Lachnagrostis filiformis: **K 000607845:** New Norfolk, xi.1840, *Gunn 1447* [orig. spec. label]; det. Brown 25.x.2017; det. Hooker? as *Deyeuxia forsteri*; cit. Hooker (1858) & Vickery (1941) [same sheet as K000607844].

Lachnagrostis filiformis: **K 000607848(b):** New Norfolk, 11.xii.1840, *Gunn 592* [orig. spec. label]; det. Brown 20.x.2017; det. Hooker? as *Deyeuxia forsteri*; cit. Hooker (1858) as *Agrostis aemula* [*with L. aemula*]. **E 00680884:** New Norfolk, 11.xii.1840, *Gunn 592*; det. Brown 5.vi.2018; det. Munro as *D. forsteri*, *L. forsteri* & *A. aemula*; ex Herb. Kew; Herb. Munro 1880; ex J.D. Hooker 1852. **GH nd01:** Van Diemen's Land, *s. dat.*, *Gunn 592*; det. Brown 2018 from image; det. Munro as *D. forsteri* & *A. aemula*; ex [Herb.] Munro; ex J.D. Hooker. **GH nd02:** Van Diemen's Land, *s. dat.*, *Gunn 592*; det. Brown 2018 from image; as *D. forsteri* & *A. aemula*; det. A.S. Hitchcock as *A. retrofracta*; ex Herb. George Thurber (purchased 1890); ex [Herb.] Munro; ex J.D. Hooker.

Lachnagrostis filiformis: **E 00680885:** Van Diemen's Land, *s. dat.*, [Hooker] *433*: det. Brown 5.vi.2018; det. anon. as *Deyeuxia forsteri* & *L. willdenowii* [pencil on sheet]; ex Herb. Kew; ex Herb. Munro 1880; ex J.D. Hooker 1852; incl. labels "very wet & dry? Places" and "Wet Marshes" [possible coll. by Lawrence or Hooker – not Gunn as *Gunn 433* was *Leucophyta brownii*].

Lachnagrostis filiformis: **HO 592197:** base of Mt Wellington, 7.i.1841, *Gunn 1447* [Gunn's Herb. label photocopy]; det anon. 1.2003; det. Vickery 19.v.1939 as *Agrostis avenacea* [photocopy]; det. anon. as *Deyeuxia forsteri* & *A. aemula* [photocopy]; ex Herb. NSW. **NSW 13509:** base of Mt Wellington, 7.1.1841, *Gunn 1447* [Gunn's Herb. label]; det. anon. i.2003; det. Vickery 19.v.1939 as *A. avenacea*; det. anon. as *D. forsteri* & *A. aemula*. **MEL 2400579A:** base of Mt Wellington, 7.1.1841, *Gunn 1447* [Gunn's Herb. label photocopy]; det. anon. i.2003; det. Vickery 19.v.1939 as *A. avenacea* [photocopy]; det. anon. as *D. forsteri* & *A. aemula* [photocopy]; ex Herb. NSW. **W 1916-0036628:** base of Mt Wellington, 7.1.1841, *Gunn 1447* [orig. label]; det. Brown 19.iv.2018; det. Hooker? as *D. forsteri*; det. Hackel? as *D. retrofracta*; ex Herb. Hackel; ex Herb. Hooker.

Lachnagrostis filiformis: **NSW 13521:** Formosa, 7.xii.1842, *Gunn 1447* [orig. spec. label & Gunn's Herb. label]; det. anon. i.2003; conf. Vickery 18.v.1939 & annot. "*Pentapogon* sp. & *Dichelachne* sp. separated from this number"; det. anon. as *Deyeuxia forsteri* & *Agrostis aemula*.

Lachnagrostis filiformis: **NSW 13520:** Cataract, South Esk, 17.xii.1844, *Gunn ~~592~~ 1447* [orig. spec. label]; det. anon. i.2003; det. anon. as *Agrostis avenacea* and with date 17.xii.1842. **K 000607844:** South Esk, Launceston, 17.xii.1844, *Gunn 1447* [orig. spec. label]; det. Brown 25.x.2017; cit. Hooker (1858) as *A. aemula* [same sheet as K 000607845].

***Lachnagrostis* 'Arthurs Lake' *(Gunn 1450)* AJBr.: NSW 13514:** Arthur's Lake, 18.ii.1843, *Gunn 1450* [orig. spec. label]; det. Brown 2018; det. anon. i.2003 as *L. aemula*; det. anon. as *L. aemula*.

***Lachnagrostis semibarbata* var. *filifolia*: K 000838252(b):** New Norfolk, 15.xi.1840, *Gunn 1446* [orig. spec. label]; det. Brown 7.vi.2018 [spec. in RHS top corner; same sheet and label as K 000838251].

***Lachnagrostis semibarbata* var. *semibarbata*: HO 35753:** New Norfolk, 15.xi.1840, *Gunn 1446*; [Gunn's Herb. label]; det. Brown 19.vi.2018; det. anon. as *L. punicea*; det. anon. as *D. forsteri*; marked as *~~592~~ 1446*; coll. Mary Ballantine. **K 000838252(a):** New Norfolk, 15.xi.1840, *Gunn 1446* [orig. spec. label]; det. Brown 7.vi.2018; det. Vickery 12.viii.1938 as *A. aemula* var. *setifolia*; det. Vickery as *Deyeuxia billardierei* var. *setifolia* & annot. "Type"; det. Bentham as *D. billardieri*; det. Hooker? as *D. billardieri* [pencil] ß [ink]; det. Hooker? as '*Deyeuxia setifolia Hf.*' [crossed out]; det. anon. as *Pentapogon billardieri* [crossed out]; cit. Vickery (1941) as Type of *A. aemula* var. *setifolia* [spec. in MID; same sheet as K 000838251]. **K 000838251:** New Norfolk, 15.xi.1840, *Gunn 1446* [orig. spec. label]; det. Brown 7.vi.2018; annot. Hubbard vii.1939 "This specimen agrees well with type of *Agrostis semibarbata* Trin." [spec. on LHS; same sheet and label as K 000838252].

***Lachnagrostis semibarbata* var. *semibarbata*: NSW 742910:** New Norfolk, 11.xii.1840, *Gunn ~~592~~ 1446* [orig. spec. label photocopy]; det. Brown 2.iii.2007 as *L. punicea* subsp. *punicea* when separated from *L. aemula*: NSW 13513.

***Lachnagrostis semibarbata* var. *semibarbata:* K 000838253:** Penquite, 9.xii.1844, *Gunn 592/1* [orig. label]; det. Brown 7.vi.2018; det. Vickery 12.viii.1938 as *Agrostis aemula* var. *setifolia*; det. Bentham as *D. billardieri*; det. Hooker? as '*D. setifolia Hf.*' [crossed out]; det. Hooker? as *D. billardieri* [pencil] ß [ink]; det. Hooker? as *Pentapogon* [crossed out] & *Deyeuxia* [crossed out]; cit. Vickery (1941) as *A. aemula* var. *setifolia* (as '*Gunn,*

No. 592') [same sheet as K 000838254]. **K 000838254:** Penquite, 9.xii.1844, *Gunn 592/1*; det Brown 7.vi.2018; annot. Hubbard vii.1939 "These specimens agree well with the type of *Agrostis semibarbata* Trin. (Hb. Leningrad)." [same sheet as K 000838253]. **W 1916-0027254:** Penquite, 9.xii.1844, *Gunn 592/1*; det. Brown 19.iv.2018; det. Molina x.2002 as *L. billardierei*; det. anon. as *'D. Billardieri* var. *setifolia* Hk.f?' [sheet]; det. Hackel? as *D. billardieri*; det. Munro as *D. billardieri* [pencil on sheet] & annot. [too faint to read]. ex Herb. Hackel 1916; [ex Herb. Munro]; ex J.D. Hooker 1852.

***Pentapogon quadrifidus* var. *quadrifidus*: HO 515168:** Tasmania, *s. dat.*, *Gunn 1476* [orig. spec. label & Gunn's Herb. label]; det. [Morris 1990?]; det. anon. viii.1976; collected by Charles Stuart. **K 000342397:** *s. loc. s. dat.*, *Gunn 1476* [orig. spec. label]; det. Brown 13.vi.2018; det. Hooker? as *Pentapogon*; cit. Hooker (1858) & probably Bentham (1878) as *P. billardieri* [probably three spec. in MID & on RHS; same sheet as K 000342398]. **E 00690201:** Tasmania, *s. dat.*, *Gunn 1476*; det. Brown 6.vi.2018; det. Munro? as *Stipa pentapogon* & *P. billardieri*; ex Herb. Kew; ex Herb. Munro 1880; ex Herb. Hooker 1852 [same sheet as E 00690202].

***Pentapogon quadrifidus* var. *quadrifidus*: NSW 550578:** mountains, New Norfolk, 5.xi.1840, *Gunn 1477* [orig. spec. label] *Gunn 1479* [Gunn's Herb. label]; conf. Brown 19.vi.2018 & annot. "frag. of *Anthosachne scabra*"; det. Kodela; det. anon. as *1479 P. billardieri.*

***Pentapogon quadrifidus* var. *quadrifidus*: NSW 550565:** Formosa, 29.x.1841, *Gunn 1477* [orig. spec. label]; det. Kodela 22.i.2003; det. anon. as *P. billardieri.* **K 000342398:** Formosa, 29.x.1841, *Gunn 1477* [orig. spec. label]; det. Brown 13.vi.2018; det. Bentham as *P. billardieri*; det. Hooker? as *Pentapogon* [ink] *billardieri* [pencil]; cit. Hooker (1858) as *P. billardieri* [probably two spec. on LHS; same sheet as K 000342397]. **E 00690202:** Formosa, 29.x.1841, *Gunn 1477*; det. Brown 6.vi.2018; det. Munro? as *Pentapogon* [pencil]; ex Herb. Kew; ex Herb. Munro 1880; ex Herb Hooker 1852 [same sheet as E 00690201].

***Pentapogon quadrifidus* var. *quadrifidus*: HO 17190:** Penquite, 13.xi.1841, *Gunn s.n.* [~~Archer's~~ Gunn's Herb. label]; det. anon. viii.1976; det. anon. as *P. billardieri.* **NSW 550575:** Penquite, 13.xi.1841, *Gunn ~~1477~~ 1478* [orig. spec. label & Gunn's Herb. label]; conf. Brown 19.vi.2018; det. Kodela; det. anon. as *P. billardieri.* **NSW 550583:** Penquite, 13.xi.1841, *Gunn ~~1477~~ 1478* [orig. spec. label] *Gunn ~~1476~~* [Gunn's Herb. label]; conf. Brown 19.vi.2018 & annot. frag. of *Briza minor* and *Anthosachne scabra*; det. Kodela; det. anon. as *P. billardieri.* **NSW 550574:** Penquite, 13.xi.1841, *Gunn 1478* [~~Archer's~~ Gunn's Herb. label]; conf. Brown 19.vi.2018 & annot. frag. of *Anthosachne scabra*; det. Kodela; det. anon. as *P. billardieri.* **UVMVT 135607:** Penquite, xi.1841, *Gunn s.n.* [~~Archer's~~ Gunn's Herb. label]; ex Herb. NSW; det. anon. as *P. billardieri.*

***Pentapogon quadrifidus* var. *quadrifidus*: NSW 550563:** Formosa, 7.xii.1842, *Gunn 1447*; det. Kodela 23.i.2003; det. as *Pentapogon*; annot. anon. "separated from a sheet of *Agrostis avenacea*": NSW 13521.

***Pentapogon quadrifidus* var. *quadridifus*: NSW 471900:** Penquite, 1.xii.1844, *Gunn 989* [Gunn's Herb. label photocopy]: det. Jacobs v.2001; det. anon. as *Dichelachne sciurea* [orig. with *Vulpia bromoides:* NSW 471901 & *D. rara:* NSW 448442]. **K 000342396:** Penquite, 1.xii.1844, *Gunn 1478* [orig. label]; det. Brown 13.vi.2018; det. Bentham as *P. billardieri*; det. Hooker? as *P. billardieri*; cit. Hooker (1858). **CGE nd04(b):** V. Diemen's Land, *s. dat.*, [*Gunn*]; conf. Brown 11.ix.2019; det. Vickery 23.vi.1948; orig. label det. as *Amphipogon avenaceus* Br.?; ex Herb. Lemann 1852; ex Herb. Lindley 1849 [three spec. on LHS; if Gunn collection, then most like *Gunn 1478*].

***Polypogon monspeliensis*: HO 128559:** marsh. Launceston, 21.xii.1844, *Gunn 1460* [Gunn's Herb. label]; det. anon. **NSW 548025:** marshes, Launceston, 24.xii.1844, *Gunn 1460* [orig. spec. label & Gunn's Herb. label]; conf. Kodela 9.i.2003; det. anon. **NSW 548018:** *s. loc.*, *s. dat.*, *Gunn s.n.* [Gunn's Herb. label]; det. anon. **K 000342390:** marsh, Launceston, 24.xii.1844, *Gunn 1460*; conf. Brown 13.vi.2018; det. Hooker?; cit. Hooker (1858) & Bentham (1878).

D. Post-Hooker (1860) distribution sets.

With a printed label "Ex Herb. Hook. Hab. TASMANIA. Coll. R.C. Gunn" and Hooker's taxon name ('as .....') written in ink (Fig. 8a); includes unidentified or misidentified specimens mixed with the main collections; probable duplicates of K collections are identified.

Agrostis parviflora (as *Agrostis parviflora*)**: C 10022010**[1]**:** det. Brown 2017 from image; det. Ryding

2017 as Type of *A. intricata* Nees? *Gunn 1011?*. **CGE 34004**[1]**:** conf. Brown 11.ix.2019. **E 00680898**[2]**:** conf. Brown 5.vi.2018. **G 00412130**[1]**:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00412132**[1]**:** det. Brown 2018 from image; ex Herb. Boissier. **GH nd13(a)**[1]**:** det. Brown 2018 from image; ex Herb. Asa Gray [bulk of spec.]. **GH nd13(b)**[2]**:** det. Brown 2018 from image; ex Herb. Asa Gray [spec. on far RHS]. **GH nd22**[2]**:** det. Brown 2018 from image; ex Herb. Asa Gray from Herb. Royal Gardens, Kew. **GOET 022989**[1]**:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1206629(a)**[1]**:** det. Van Pappendrecht xi.1978; No. 908. 77-144; det. anon. (small label) as *Agrostis scabra* [not specified]; ex Herb. Lugd. Bat. [*L. filiformis:* L.1206322 separated from this sheet; bulk of spec.]. **L 1206629(b)**[2]**:** det. Van Pappendrecht xi.1978; No. 908. 77-144; det. anon. (small label) as *Agrostis scabra* [not specified]; ex Herb. Lugd. Bat. [shorter spec. on LHS and MID parts of sheet]. **M 0296262(a)**[1]**:** det. Brown 2019 from image [RHS spec.]. **M 0296262(b)**[2]**:** det. Brown 2019 from image [LHS spec.]. **NY 04241819**[2]**:** det. Brown 2020 from image [unstamped]. **NY 04241820**[2]**:** det. Brown 2020 from image; ex Herb. Meisner. **OXF 00162500**[2]**:** det. Brown 2020 from image; ex Fielding Original Herb. **P 02651176(a)**[1]**:** conf. Brown 2.x.2019; Donné par Sir William Hooker 1863 [MID spec.]. **P 02651176(b)**[2]**:** conf. Brown 2.x.2019; Donné par Sir William Hooker 1863 [two LHS and two RHS spec.]. **P 03639323**[1]**:** conf. Brown 2.x.2019; ex Herb. Al. de Bunge. **S 14-40593**[1]**:** conf. Brown 12.vi.2018. **TCD 0018329(a)**[1]**:** det. Brown 2018 from image [bulk of spec.]. **TCD 0018329(b)**[2]**:** det. Brown 2018 from image [spec. on LHS (except far LHS) and taller spec. in MID]. **UPS V–926777**[2]**:** det. Brown 2018 from image; det. anon. as syn. *A. scabra* Willd. **US 843450**[2]**:** det. Brown 2020 from image. **US 843452**[2]**:** det. Brown 2020 from image. **W 0007130(a)**[1]**:** conf. Brown 19.iv.2018 ['Naturhistorisches Museum Wein' retangular stamp; LHS spec.]; **W 0007130(b)**[2]**:** conf. Brown 19.iv.2018 ['Naturhistorisches Museum Wein' retangular stamp; RHS spec.]. **W 1886-0007673**[1]**:** det. Brown 19.iv.2018; det. anon. as *A. scabra* [not specified]. **W 1889-0098321**[1]**:** conf. Brown 19.iv.2018; det. anon. as syn. *Agrostis scabra* [not specified]; ex Herb. H. Reichenbach. **WU 0120093**[1]**:** det. Brown 2020 from image; Acq. Journ. No.305. **ZT 00194827**[1]**:** det. Brown 2020 from image. *Note: based on panicle age, [1]probable dupl. of K 000838279 (green and younger); [2]probable dupl. of K 000838280(b) (brown and older).*

Agrostis venusta (as *Agrostis venusta*)**: C 10022011:** det. Brown 2017 from image; det. Ryding 2017 as = *Gunn 1008*? Type of *Lachnagrostis willdenowii* Nees? (see Brown 2019a). **CGE 34006:** conf. Brown 11.ix.2019. **E 00680907:** conf. Brown 5.vi.2018. **G 00412134:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00412133:** det. Brown 2018 from image; ex Herb. Boissier. **GH nd16:** det. Brown 2018 from image; ex Herb. Asa Gray. **GH nd25:** det. Brown 2018 from image; ex Herb. Asa Gray from Herb. Royal Gardens, Kew. **GOET 022974:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1208419:** det. Brown 2017 from image; No. 908. 77-373; ex Herb. Lugd. Bat. **M 0296263:** det. Brown 2019 from image. **NY 04241813:** det. Brown 2020 from image; ex Herb. Meisner. **NY 04241814:** det. Brown 2020 from image [unstamped]. **OXF 00162535:** det. Brown 2929 from image; ex Fielding Original Herb. **P 02255659:** conf. Brown 2.x.2019; Donné par Sir William Hooker 1863. **P 02332981(a):** conf. Brown 2.x.2019; ex Herb. S.R. Lenormand [bulk of spec.]. **P 02307565:** conf. Brown 2.x.2019; ex Herb E. Cosson. **S 14-40930:** conf. Brown 12.vi.2018. **TCD 0018331:** det. Brown 2018 from image. **UPS V–926738:** det. Brown 2018 from image. **US 843479:** det. Brown 2020 from image. **US 843481:** det. Brown 2020 from image; ex Herb. Gray. **W 0025344:** conf. Brown 19.iv.2018 ['Naturhistorisches Museum Wein' retangular stamp]. **W 1886-0007676:** conf. Brown 19.iv.2018 [unstamped]. **W 1889-0098322:** conf. Brown 19.iv.2018; ex Herb. H. Reichenbach. **WU 0120094:** det. Brown 2020 from image; Acq. Journ. No.305. **ZT 00194828:** det. Brown 2020 from image. *Note: probable dupl. of K 000607840, K 000607843 or K 000838272–73 but unable to visually make definitive links to specific collections. As there are no dupl. of the K collections at NSW or HO, non-mixing of the separate collections sent to K cannot be verified. As the two NSW collections (NSW 548416; NSW 548417) are not represented at K, it is possible that dupl. of these collections, if sent to K, may also have been used and completely exhaused in the 'post-Hooker (1860)' exsiccatae.*

Deyeuxia monticola (as *Agrostis montana*)**: GH nd12:** det. Brown 2018 from image; ex Herb. Asa Gray. **P 02650876:** det. Brown 2.x.2019; det. anon. as *Lachnagrostis* & *Agrostis montana* Hook.fil.; Donné par

Sir William Hooker 1863. **TCD 0018328:** det. Brown 2018 from image. *Note: probable all dupl. of K 000342413, based on panicle width, but uncertain.*

Deyeuxia quadriseta (as *Agrostis quadriseta*)**: C 10022107:** det. Brown 2017 from image; det. anon. as *Deyeuxia g.* [pencil]. **CGE 34016(a):** conf. Brown 11.ix.2019; det. Vickery 12.viii.1938 with *D. densa:* CGE 34016(b): conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; cit. Vickery (1940) as Gunn coll. [unlikely to be Gunn – see footnote 6]. **E 00662783:** det. Brown 6.vi.2018. **G 00412140:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00412141:** det. Boissier; det. Brown 2018 from image; ex Herb. Boissier. **GH nd14(a):** det. Brown 2018 from image; with *D. quadriseta:* GH nd14(b): Tasmania, W. Archer s.n. ex Herb. Hooker and *D. quadriseta:* GH nd14(c): No. 69, Pukeatua, North Island, New Zealand ex Herb. T. Kirk; ex Herb. Asa Gray. **GH nd23:** det. Brown 2018 from image; ex Herb. Asa Gray from Herb. Royal Gardens, Kew. **GOET 022976:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1242855:** det. anon. (small label); det. Herb. Lugd. Bat. as *Calamagrostis quadriseta*; No. 908. 86-1965; ex Herb. Lugd. Bat. **M 0296273:** det. Brown 2019 from image; det. anon. as *C. quadriseta*. **NY 04241817:** det. Brown from image [unstamped]. **NY 04241818:** det. Brown 2020; ex Herb. Meisner. **OXF 00163953:** det. Brown from image; Fielding Original Herb. **P 02651185:** det. Brown 2.x.2019; Donné par Sir William Hooker 1863. **P 03228338:** det. Brown 2.x.2019; ex Herb. S.R. Lenormand. **P 02651184:** det. Brown 2.x.2019; ex Herb. E. Cosson; ex Herb. E. Durand; ex Herb. Al. de Bunge. **S 17-54108:** det. Brown 12.vi.2018; det. anon. as syn. *C. quadriseta* [pencil]. **TCD 0018325:** det. Brown 2018 from image. **US 843503:** det. Brown 2021 from image; det. Poaceae Reorganization Project as *Dichelachne quadriseta* Ined.; ex Herb. of U.S. Dept. Ag. **US 843505:** det. Brown 2021 from image; det. Poaceae Reorganization Project as *Dichelachne quadriseta* Ined.; ex U.S. Dept. of Ag., Div. Agrost.; ex Herb. A. Gray. **UPS V–926724:** det. Brown 2018 from image; det. anon. as *Calamagrostis* [pencil]. **W nd13:** det. Brown 19.iv.2018 [unstamped]. **W 1886-0007674:** det. Brown 19.iv.2018. **W 1889-0098321:** det. Brown 19.iv.2018; ex Herb. H. Reichenbach. **ZT 00194826:** det. Brown 2020 from image. *Note: probable dupl. of K 000342403, K 000342417, K 000342404, K 000342405 or K 000342406 but due to variation between panicle characters within the same collections, visually assigned matches cannot be made with any confidence.*

Deyeuxia scaberula (as *Agrostis billardierii* ß)**: P 03228341(d):** det. Brown 2.x.2019; ex Herb. S.R. Lenormand [two spec.: one on LHS, one on RHS side; lemma size and indumentum approach *D. decipiens* (R.Br.) Vickery but overall appearance of the very mature inflorescences conform to *D. scaberula*]. *Note: probable dupl. of K 000636402 (see next entry).*

Deyeuxia scaberula (as *Agrostis scabra* R.Br.)**: C 10022109:** det. Brown 2017 from image; det. Brown 2018 from image; det. anon. as *Agrostis rudis* [pencil]. **CGE 34018:** conf. Brown 11.ix.2019; det. Vickery 12.viii.1938; det. anon. as *Deyeuxia scabra* [pencil]. **E 00680904:** det. Brown 7.vi.2018. **G 00412138:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00412139:** det. Brown 2018 from image; det. Boissier as *D. scabra*; ex Herb. Boissier. **GH nd15:** det. Brown 2018 from image; ex Herb. Asa Gray. **GH nd24:** det. Brown 2018 from image; ex Herb. Asa Gray from Herb. Royal Gardens, Kew. **GOET 022979:** det. Brown 2019 from image; ex Herb. Grisebach. **L 0044086:** det. anon. (small label); det. anon. as Type of *D. scaberula*; No. 908. 77-130; ex. Herb. Lugd. Bat. **M** (not found)**:** appears as No. 234 on M historical inventory list 'Plantae Tasmanicae. Coll. Gunn et Archer. Ex herb. Hook. Communis. Hooker & Tannert 1863'. **NY 04241815:** det. Brown 2020 from image [unstamped]. **NY 04241816:** det. Brown 2020 from image; ex Herb. Meisner. **OXF 00162543:** det. Brown from image; Fielding Original Herb. **P 02651175:** det. Brown 2.x.2019; Donné par Sir William Hooker 1863. **P 02332986:** det. Brown 2.x.2019; ex Herb. S.R. Lenormand. **P 03228398:** det. Brown 2.x.2019; det. anon. as *Calamagrostis rudis*; ex Herb. Al. de Bunge. **TCD 0018330(a):** det. Brown 2018 from image [LHS and MID spec.]. **US 843539:** det. anon.; det. anon. 2018 as *Calamagrostis austroscaberula* Govaerts; ex Herb. U.S. Dept. Ag., Div. Agrost. **US 843540:** det. Brown 2021 from image; det. anon. as *C. austroscaberula*; det. anon. 2018 as *Agrostis hyemalis* '(Walt.) Tuck.'; ex Herb. U.S. Dept. Ag., Div. Agrost.; ex Herb. A. Gray. **W nd14:** det. Brown 19.iv.2018 [unstamped]. **W 1886-0007675:** det. Brown 19.iv.2018. **W 1889-0098324:** det. Brown 19.iv.2018; ex Herb. H. Reichenbach. *Note: most, if not all spec., probable dupl. of K 000838402 as other candidates appear*

ill-matched: K 000342411 has few-flowered panicles and K 000342409 is a probable contaminant of a D. frigida collection.

Dichelachne crinita (as *Dichelachne crinita*)**: C 10022105**[1]**:** det. Brown 2017 from image. **CGE 34019**[1]**:** conf. Brown 11.ix.2019. **G 00412143**[1]**:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **GH nd17**[1]**:** det. Brown 2018 from image; ex Herb. Asa Gray. **GOET 022984**[1]**:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1243628**[2]**:** det. Veldkamp xi.1973; No. 908. 87-210; ex. Herb. Lugd. Bat. **M 0296257**[2]**:** det. Brown 2019 from image. **P 02257148**[2]**:** conf. Brown 2.x.2019; det. Hallé 18.v.1984; Donné par Sir William Hooker 1863. **S 06-18201**[1]**:** conf. Brown 12.vi.2018 with *Dichelachne crinita:* S06-18202**:** N.Z. **TCD 0018332**[2]**:** det. Brown 2018 from image. **W nd12**[2]**:** conf. Brown 19.iv.2018 ['Herbarium Musei Caesar Palat. Vindobonensis' elongated octagonal stamp]. **W 1886-0007680**[1]**:** conf. Brown 19.iv.2018. **W 1889-0244444**[1]**:** conf. Brown 19.iv.2018; ex Herb. H. Reichenbach. **WU 0120096**[2]**:** det. Brown 2020 from image; Acq. Journ. No.305. **ZT 00194829**[2]**:** det. Brown 2020 from image; det. anon. as *Agrostis crinita*; det. anon. as *D. vulgaris*. *Note: based on panicle width and compactness, [1]probable dupl. of K 000356725 or K 000913401 but unable to visually separate with confidence; [2]probable dupl. of orig. K coll. from which K 000913404 (ex. Munro 1880, ex. Hooker 1852) was drawn but probable exhausted for the exsiccatae.*

Dichelachne crinita (as *Dichelachne sciurea*)**: W 1997-04381:** det. Edgar 6.iv.1982. *Note: probable dupl. of K 000356725.*

Dichelachne sieberiana (as *Dichelachne sciurea*)**: C 10022110**[1]**:** det. Brown 2017 from image. **GH nd18**[1]**:** det. Brown 2018 from image; ex Herb. Asa Gray. **L 0044115**[1]**:** det. Veldkamp 1973 as holo of *D. rara* subsp. *asperula*; No. 908. 87-224; ex. Herb. Lugd. Bat. **M 0296258**[1]**:** det. Brown 2019 from image. **P 00640973**[1] [Fig. 8]**:** det. Brown 2.x. 2019; det. Hallé 18.v.1984 as *Dichelachne rara* subsp. *asperula* & marked as Type; det. Veldkamp ii.1970 as *Dichelachne puberula* sp. nov.; orig. label marked '*989*' [pencil]; Iso label; Donné par Sir William Hooker 1863. **S 06-18158**[1]**:** det. Brown 12.vi.2018. **TCD 0018333**[1]**:** det. Brown 2018 from image. **W 1997-04382**[2]**:** det. Brown 19.iv.2018; det. Edgar 7.iv.1982 as *D. rara* subsp. *asperula*. *Note: based on panicle width and compactness, [1]probable dupl. of K 000342388; [2]probable dupl. of K 000356726.*

Dichelachne sieberiana (as *Pentapogon billardierii*)**: WU 0120097:** det. Brown 2020 from image; Acq. Journ. No.305. *Note: probable dupl. of K 000356726.*

Echinopogon ovatus (as *Echinopogon ovatus*)**: C 10022104**[2]**:** det. Brown 2017 from image. **CGE 34003**[2]**:** conf. Brown 11.ix.2019. **E 00692036**[1]**:** conf. Brown 5.vi.2018. **G 00412145**[1]**:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00142144**[2]**:** det. Brown 2018 from image; ex Herb. Boissier. **GOET 022973**[1]**:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1248923**[2]**:** det. Brown 2017 from image; No. 908. 87-469; ex. Herb. Lugd. Bat. **M 0296264**[2]**:** det. Brown 2019 from image. **NY 04206200**[2]**:** det. Brown 2020 from image; ex Herb. Columbia University. **OXF 00162539**[1]**:** det. Brown from image; Fielding Original Herb. **P 02218720**[2]**:** conf. Brown 2.x.2019; det. anon. *Echinopogon ovatus* & *Cinna ovata*; Donné par Sir William Hooker 1863. **P 02218721**[2]**:** conf. Brown 2.x.2019; ex Herb. E. Cosson; ex Herb. E. Durand; ex Herb. Al. de Bunge. **S 06-10778 *n.v.*:** conf. Brown 12.vi.2018. **TCD 0018322**[1]**:** det. Brown 2018 from image. **US 996606:** ex Herb. U.S. Dept. Ag. **UPS V–926721**[2]**:** det. Brown 2018 from image. **W nd17**[2]**:** conf. Brown 19.iv.2018 [unstamped]. **W 1886-0007632**[2]**:** conf. Brown 19.iv.2018. **W 1889-0062960**[2]**:** conf. Brown 19.iv.2018; ex Herb. H. Reichenbach. **WU 0120091**[1]**:** det. Brown 2020 from image, Acq. Journ.No. 305. **ZT 00194830**[1]**:** det. Brown 2020 from image. *Note: the source of these spec. is difficult to establish – only two known Gunn coll. are at K: a) K 000342402 was sent to William Hooker in 1835, of which part was given to Lindley, who in turn sent dupl. to Bentham, W and P during 1838–1839 – Joseph Hooker sent a spec. from K to Munro in 1852 but as no residue of the original coll. can be found, it is not known if the source was the 1835 coll. or a later unrecorded one – Bentham brought his ex Lindley dupl. to K in 1854, from which it appears he later sent a spec. to NY; b) K 000342401 was sent to William Hooker in the '1837' consignment from which a spec. was mounted with a Robert Lawrence collection from 1833 – the 1837 collection may have provided the material for the 'post Hooker (1860)' exsiccatae, although some spec.[1] have larger spikelets compared to spec.[2] of similar size, of which both the K sheets currently comprise.*

Lachnagrostis aemula (as *Agrostis aemula*)**: CGE 34009(a)**[1]**:** det. Brown 11.ix.2019 [LHS erect; LHS and RHS, folded spec.]. **G 00412135(b)**[1]**:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863 [LHS and MID

spec. & some frag.]. **GOET 022978–sheet 2(b)[1]:** det. Brown 2019 from image; ex Herb. Grisebach [lower RHS spec.]. **L 1206309(b)[3]:** det. Brown 2017 from image; det. Henrard as *Agrostis avenacea*; det. anon. (small label) as ~~*Deyeuxia forsteri*~~; No. 908. 87-368; ex Herb. Lugd. Bat. [top LHS spec. behind LHS sheaf]. **NY 04241821(a)[1]:** det. Brown 2020 from image; ex Herb. Meisner [LHS and RHS spec.]. **OXF 00162531(a)[3]:** det. Brown from image; Fielding Original Herb. [1st & 3rd spec. from LHS: relatively larger spikelets]. **OXF 00162531(b)[1]:** det. Brown from image; Fielding Original Herb. [2nd & 4th spec. from LHS: relatively smaller spikelets]. **P 02650913(b)[2]:** det. Brown 2020 from image; det. anon. as *Lachnagrostis/Deyeuxia aemula*; Donné par Sir William Hooker 1863 [2nd spec. from RHS]. **TCD 0018327(b)[2]:** det. Brown 2018 from image [MID spec.: 5th from LHS]. **US 843482:** det. Brown 2021 from image; det. Poaceae Reorganization Project as *Lachnagrostris filiformis*; det. anon. as *Agrostis venusta*; ex Herb. U.S. Dept. Ag. **UPS V–927003[1]:** det. Brown 2018 from image; det. anon. as *Calamagrostis* [pencil]. **WU 0120092(a)[1]:** det. Brown from image; Acq. Journ. No.305 [far LHS spec.; RHS folded spec.; inflor. fragments]. **ZT 00194823(a)[1]:** det. Brown 2020 from image [taller, folded spec.]. *Note: the source of these spec. are not at all certain but based on spikelet size and panicle appearance (despite variation between dupl. of the same coll. at NSW, HO and K), [1]possible dupl. of K 000607846–47; [2]possible dupl. of K 000607848(b); [3]possible dupl. of K 000607849.*

Lachnagrostis aemula (as *Agrostis billardierii ß*)**:** **P 03228341(c):** det. Brown 2.x.2019; ex Herb. S.R. Lenormand [two spec.: 2nd from RHS, culm and detached inflorescence; MID shreaded inflorescence with stunted spikelets]. *Note: possible dupl. of K 000607849.*

Lachnagrostis billardierei* subsp. *billardierei (as *Agrostis billardierii*)**:** **GH nd11(a):** det. Brown 2018 from image [two spec. on RHS side]; with *L. billardierei* (as *A. billardieri*): GH nd11(b): No. 321, Nelson, South Island, New Zealand ex Herb. T. Kirk [MID spec.]; ex Herb. Asa Gray. **P 02650854:** det. Brown 2.x.2019; det. anon. as *Deyeuxia billardieri*; Donné par Sir William Hooker 1863. **TCD 0018324(a):** det. Brown 2018 from image [two LHS and MID-RHS spec.]. **W nd10:** det. Brown 19.iv.2018 [unstamped]. *Note: all Gunn spec. probable dupl. of K 000342399.*

Lachnagrostis billardierei* subsp. *billardierei (as *Agrostis billardierii ß*)**:** **P 03228341(b):** det. Brown 2.x.2019; ex Herb. S.R. Lenormand [one spec.: across bottom of sheet]. *Note: probable dupl. of K 000342399.*

Lachnagrostis filiformis (as *Agrostis aemula*)**:** **C 10022108[2]:** det. Brown 2017 from image. **CGE 34009(b)[2]:** det. Brown 11.ix.2019 [MID and RHS, erect spec., overlying *L. aemula*: CGE 34009(a)]. **E 00680869[2]:** det. Brown 5.vi.2018; [broad leaved culm possible ex *L. aemula* spec.]. **G 00412135(a)[2]:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863 [RHS spec. & some frag.]. **GH nd09(a)[1]:** det. Brown 2018 from image; with *L. filiformis* (as *A. aemula*): GH nd09(b): No. 77, , Tamaki, South Island, New Zealand ex Herb. T. Kirk; ex Herb. Asa Gray. **GH nd21[1]:** det. Brown 2018 from image; ex Herb. Asa Gray from Herb. Royal Gardens, Kew. **GOET 022978-sheet 1[3]:** det. Brown 2019 from image; ex Herb. Grisebach. **GOET 022978-sheet 2(a)[2]:** det. Brown 2019 from image; ex Herb. Grisebach [bulk of spec.]. **L 1206309(a)[2]:** det. Brown 2017 from image; det. Henrard as *Agrostis avenacea*; det. anon. (small label) as ~~*Deyeuxia forsteri*~~; No. 908. 87-368; ex Herb. Lugd. Bat. **M 0296274[3]:** det. Brown 2019 from image; det. anon. as *Calamagrostis filiformis*; det. anon. as *Calamagrostis forsteri*. **NY 04241821(b)[2]:** det. Brown 2020 from image; ex Herb. Meisner [MID spec.]. **NY 04241822[1]:** det. Brown 2020 from image [unstamped]. **P 02650913(a)[2]:** det. Brown 2.x.2019; det. anon. as *Lachnagrostis/Deyeuxia aemula*; Donné par Sir William Hooker 1863 [with *Poa* sp. contaminant]. **P 03228336[2]:** det. Brown 2.x.2019; ex Herb. S.R. Lenormand. **P 02650914[3]:** det. Brown 2.x.2019; ex Herb. E. Cosson; ex Herb. E. Durand; ex Herb. Al. de Bunge. **S 17-54387[3]:** det. Brown 6.vi.2018; det. Vestergren 1924 as '*A. retrofracta* Willd. 1809, syn. *A. Forsteri* Roem. & Schult. 1817, *Calamagrostis Forsteri* Steud. 1840, *C. retrofracta* Link 1840'; det. anon. as *Calamagrostis filiformis* [pencil]. **TCD 0018327(a)[2]:** det. Brown 2018 from image [bulk of spec.; with *Poa* sp. and *Hypochaeris*? sp. as contaminants in RHS sheaf]. **US 863650:** det. Poaceae Reorganisation Project; det. anon. as *Calamagrostis forsteri* Kth.; ex U.S. Dept. Ag., Div. Agrost.; ex Herb. A. Gray. **W nd09[2]:** det. Brown 19.iv.2018 [unstamped]. **W 1886-0007670[2]:** det. Brown 19.iv.2018. **W 1889-0098323[2]:** det. Brown 19.iv.2018; det. anon. as *Gutteria obtusifolia*; ex Herb. H. Reichenbach. **WU 0120092(b)[2]:** det. Brown from image; Acq. Journ. No.305 [MID lower spec.; RHS erect spec.]. **ZT 00194823(b)[2]:** det. Brown 2020 from image [shorter, erect spec.]. *Note:*

[1]probable dupl. of K 000607839 (base of Mt Wellington, Mar. 1838) based on open panicles with wavy, divergent branches; [2]the source of these spec. is difficult to establish – apart from K 000607839, there are four coll. at K, of which three were collected from New Norfolk between Dec. 1839 and Dec. 1840 – all of the New Norfolk coll. have newly emerging panicles and do not appear to match any of the 'post-Hooker (1860)' spec. – although K 000607838 and K 000607845 may represent remnants (each of a single emerging panicle only) of the 'post-Hooker (1860)' dispersion, K 000607848(a) is a larger and more complete coll. but has finer leaves than the exsiccatae – the South Esk, Dec. 1844 coll. (K 000607844) is the most likely source for the bulk of 'post-Hooker (1860)' spec. but the Gunn coll. from the base of Mt Wellington, Jan. 1841 (NSW 13509) and from Formosa, Dec. 1842 (NSW 13521) are also possibilities, though no remnants remain at K; [3]differences in spikelet size and panicle exsertion and branch divergence between spec., suggest these sheets may have mixed sources.

Lachnagrostis filiformis (as *Stipa pubescens*)**: GOET 022981(b):** det. Brown 2019 from image; with *Austrostipa pubinodis:* GOET 022981(a): det. Brown 2019 from image; ex Herb. Grisebach. *Note: possible dupl. of K 000607844 but uncertain.*

Lachnagrostis filiformis (as *Agrostis parviflora*)**: L 1206322:** det. Brown 2017 from image; det. Van Papendrecht as *Agrostis avenacea*; separated from *Agrostis parviflora:* L 1206629; No. 908. 77-144; ex Herb. Lugd. Bat. *Note: possible dupl. of K 000607844 but uncertain.*

Lachnagrostis filiformis (as *Agrostis venusta*)**: P 02332981(b):** det. Brown 2.x.2019; ex Herb. S.R. Lenormand [mixed spec. toward base of sheaf]. *Note: possible dupl. of K 000607844 but uncertain.*

Lachnagrostis filiformis (as *Agrostis billardierii ß*)**: NY 04241823(b):** det. Brown 2020 from image; ex Herb. Meisner [LHS spec.]. **W 1889-0098325(b):** det. Brown 19.iv.2018; ex Herb. H. Reichenbach [spec. on LHS side and two spec. on RHS]. *Note: possible dupl. of K 000607844 but uncertain.*

Lachnagrostis rudis* subsp. *rudis (as *Agrostis aequata*)**: C 10022009:** det. Brown 2017 from image; det. Ryding 2017 as = Gunn 1005? Type of *A. aequata*?. **CGE 34008:** det. Brown 11.ix.2019. **G 00412129:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00412128:** det. Brown 2018 from image; det. Boissier as *A. aequata* Bth. (? *Deueuxia aequata* Benth.); ex Herb. Boissier. **GH nd10:** det. Brown 2018 from image; ex Herb. Asa Gray. **GOET 022975:** det. Brown 2019 from image; ex Herb. Grisebach. **L 0043515:** det. Brown 2017 from image; det. anon. as Type duplicate of *A. aequata*; No. 908. 87-189; ex Herb. Lugd. Bat. **M 0296261:** det. Brown 2019 from image. **P 02650835:** det. Brown 2.x.2019; Donné par Sir William Hooker 1863. **P 03639281:** det. Brown 2.x.2019; ex Herb. Al. de Bunge. **S 05-9040:** det. Brown 12.vi.2018. **TCD 0018326:** det. Brown 2018 from image. **W 0026797:** det. Brown 19.iv.2018; det. Pignotti 10.ix.2010 as probable Type of *A. aequata* ['Naturhistorisches Museum Wein' retangular stamp]. **W 1886-0007671:** det. Brown 19.iv.2018; det. Pignotti 10.ix.2010 as probable Type of *A. aequata.* **W 1889-0098330:** det. Brown 19.iv.2018; det. Pignotti 10.ix.2010 as probable Type of *A. aequata*; ex Herb. H. Reichenbach. **WU 0120098:** det. Brown from image; Acq. Journ. No.305. **ZT 00194824:** det. Brown 2020 from image. *Note: all spec. probable dupl. of K 000838269–70.*

Lachnagrostis rudis* subsp. *rudis (as *Agrostis aemula*)**: CGE 34009(c):** det. Brown 11.ix.2019 [one spec. overlying MID spec. of *L. filiformis*: CGE 34009(b)]. *Note: probable dupl. of K 000838269–70.*

Lachnagrostis rudis* subsp. *rudis (as *Agrostis scabra*)**: TCD 0018330(b):** det. Brown 2018 from image [RHS spec.]. *Note: probable dupl. of K 000838269–70.*

Lachnagrostis semibarbata* subsp. *semibarbata (as *Agrostis billardierii ß*)**: C 10022103[2]:** det. Brown 2017 from image. **CGE 34014[2]:** det. Brown 11.ix.2019; det. Vickery 12.viii.1938; det. anon. as *Deyeuxia billardieri* [pencil]. **E 00680888[1]:** det. Brown 5.vi.2018. **G 00412137[2]:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **GH nd11(c)[2]:** det. Brown 2018 from image [two spec. on LHS]; ex Herb. Asa Gray. **GOET 022977[2]:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1206060[2]:** det. Brown 2017 from image; det. Veldkamp i.1981 as *Agrostis aemula* var. *setifolia* & possible iso; det. Henrard as *Calamagrostis billardieri*; No. 908. 87-332; ex Herb. Lugd. Bat. **M 0296275[2]:** det. Brown 2019 from image; det. anon. as *Calamagrostis billardierii*. **NY 04241823(a)[1]:** det. Brown 2020 from image; ex Herb. Meisner [RHS spec.]. **OXF 00163935[2]:** det. Brown from image; Fielding Original Herb. **P 02650855[2]:** det. Brown 2.x.2019; det. anon. as *Deyeuxia billardieri*; Donné par Sir William Hooker 1863. **P 03228341(a)[2]:** det.

Brown 2.x.2019; ex Herb. S.R. Lenormand [one spec.: 2nd from LHS]. **P 02650865**[2]**:** det. Brown 2.x.2019; ex Herb. E. Cosson; ex Herb. E. Durand; ex Herb. Al. de Bunge. **S 17-54106**[2]**:** det. Brown 12.vi.2018; det. anon. as '*aemula*' [pencil]. **S 17-54107**[1]**:** det. Brown 12.vi.2018; det. anon. as *Calamagrostis* [pencil]; det. anon. as *'A. aemula* R.Br. var. *setifolia* (Hook. f.) Vickery' [pencil]. **TCD 0018324(b)**[2]**:** det. Brown 2018 from image [MID-LHS and RHS spec.]. **US 843353:** det. Brown 2021 from image; det. Poaceae Reorganization Project as *Lachnagrostis billardieri*; ex Herb. U.S. Dept. Ag. **W nd11**[2]**:** det. Brown 19.iv.2018 [unstamped]. **W 1886-0007672**[2]**:** det. Brown 19.iv.2018. **W 1889-0098325(a)**[2]**:** det. Brown 19.iv.2018; ex Herb. H. Reichenbach [second spec. from LHS]. **WU 0120095**[1]**:** det. Brown 2020 from image; Acq. Journ. No.305. **ZT 00194825**[2]**:** det. Brown 2020 from image [with *Avena* sp. as contaminant]. *Note: based on panicle width and branch divergence and overall specimen length, [1]possible dupl. of K 000838251–52(a) (mostly shorter specimens with more compact panicles); [2]possible dupl. of K 000838253-54 (longer specimens and more open panicles).*

Pentapogon quadrifidus (as *Pent. billardierii*)**:** **C 10022106**[1]**:** det. Brown 2017 from image; det. anon. as *Pentapogon* [pencil]. **CGE 33441**[1]**:** det. Brown 11.ix.2019 [with *Vulpia bromoides* as contaminant]. **G 00412147**[2]**:** det. Brown 2018 from image; ex Herb. A. de Candolle 1863. **G 00412146**[1]**:** det. Brown 2018 from image; det. Boissier as *Pentapogon billardieri*; ex Herb. Boissier. **GH nd19**[1]**:** det. Brown 2018 from image; ex Herb. Asa Gray. **GOET 022972**[1]**:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1303628**[1]**:** det. Brown 2017 from image; det. anon. as *Pentapogon*; No. 908. 93-2711; ex Herb. Lugd. Bat. **M 0296259**[1]**:** det. Brown 2019 from image; det. anon. as *Pentapogon*. **M 0296260(b)**[1]**:** det. Brown 2019 from image; label with 'ad radicem *Pentagonis billardierii* R.Br.' [one culm and short panicle only]; with *Vulpia bromoides:* M 0296260(a): det. Brown 2019 from image; without standard label but with 'Herb. Hooker' 'Tasmania Gunn'. **P 02257125**[1]**:** det. Brown 2.x.2019; det. anon. *Pentapogon billardieri*; Donné par Sir William Hooker 1863. **P 02257126**[1]**:** det. Brown 2.x.2019; ex Herb. E. Cosson; ex Herb. E. Durand; ex Herb. Al. de Bunge. **TCD 0018334**[1] (as *Pentapogon billardierii*)**:** det. Brown 2018 from image. **W nd16**[1]**:** det. Brown 19.iv.2018; det. anon. as '*Pentameris* ? (= *Danthonia*)' [pencil] ['Herbarium Musei Caesar Palat. Vindobonensis' elongated octagonal stamp]. **W 1886-0007687**[1]**:** det. Brown 19.iv.2018; det. anon. as *Pentapogon* [pencil]. **W 1889-0028590**[2]**:** det. Brown 19.iv.2018; ex Herb. H. Reichenbach. *Note: based on panicle emergence and compactness, [1]probable dupl. of K 000342396; [2]probable dupl. of K 000342398.*

Polypogon monspeliensis (as *Polypogon monspeliensis*)**:** **GH nd20(a):** det. Brown 2018 from image; with *P. monspeliensis:* GH nd20(b): Mendoza, E.C. Reed s.n.; ex Herb. Asa Gray. **GOET 022971:** det. Brown 2019 from image; ex Herb. Grisebach. **L 1330995:** det. Brown 2017 from image; No. 908. 97-2036; ex Herb. Lugd. Bat. **M 0296265:** det. Brown 2019 from image. **P 02244134:** conf. Brown 2.x.2019; Donné par Sir William Hooker 1863. **TCD 0018323:** det. Brown 2018 from image. **W nd15:** conf. Brown 19.iv.2018 [unstamped]. *Note: probable all dupl. of K 000342390.*

Notes: Specimens in each of Sections A, B, & C, are grouped together on the basis of taxon and collection number, date and location as probable duplicates of one gathering. Taxon names are those currently accepted by APC (2021). Additional non-Tasmanian specimens on mixed collection sheets are indicated by 'with', 'and' or 'overlying'. Where more than one taxon or collection is recognised for the same herbarium catalogue number, they are separated here by '(a)', '(b)', '(c)' and '(d)'. Specimen details include the most pertinent contained on labels (including determinations) and on sheets (including annotations), while current comments on details or probable details are in brackets. Handwriting has been identified were possible but should be only be regarded as the most probable author, based on comparisons with known (or assumed) examples. Abbreviations: ***s. loc.*** = location not provided; ***s. dat.*** = collection date not provided; s.n. = collection number not supplied; annot. = annotated (in ink unless noted otherwise; palea = lemma in Hooker annot. [Hooker (1858) differentiated between lower and upper palea for lemma and palea respectively, while Bentham (1878) used the term 'flowering glume' when referring to the lemma]; cit. = cited by (to be found under taxon name according to author's treatment); conf. = confirmed (as current name); coll. = collection/s; consign. = consignment; corres. = corresponding; det. = determination (as current name unless otherwise noted; in order of most recent to earliest; in ink and on or assoc. with label unless noted otherwise; 'det. Hooker' refers to J.D. Hooker; 'det. Nees' refers to Nees von Esenbeck; 'det. from image' lacks a determination label); dupl. = duplicate; fig. = figure; frag. = fragment/s; Herb. = herbarium; ***leg. ign.*** = unknown collector; LHS = left-hand-side; MID = middle; nd = not databased; orig. = original ('orig. label' refers to an original solid label, whereas 'orig. spec. label' refers to an original specimen label with parallel slits); p.p. = pro parte (in part); RHS = right-hand-side; spec. = specimen/s.

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